DELTA DESIGN
INC.

9385

INSTRUCTION MANUAL

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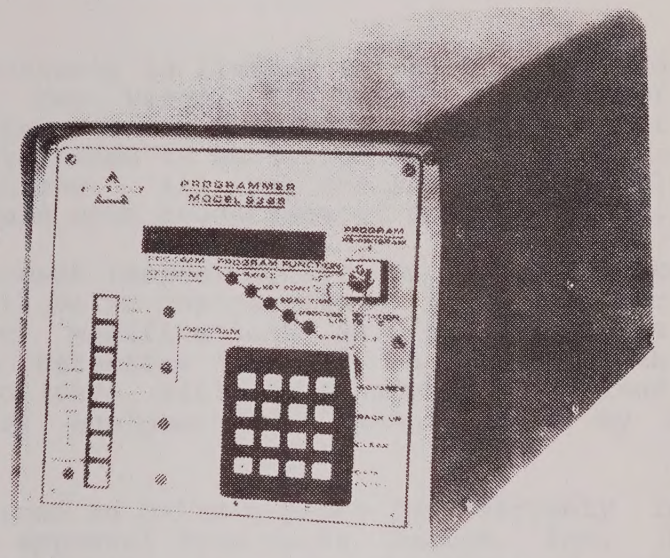
INSTRUCTION MANUAL
Model 9385



DELTA DESIGN
INC

DIGITAL PROGRAMMER

(Microcomputer Based)

ENVIRONMENTAL CONTROL EQUIPMENT FOR RESEARCH AND INDUSTRY
KEARNY VILLA ROAD • SAN DIEGO, CALIFORNIA 92123

GRII

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1.0 INTRODUCTION.

The Delta Design Model 9385 Temperature programmer is a microcomputer based programmer used with the Delta Type V Temperature Controller. The programmer/temperature controller combination provides the automatic temperature sequencing that is required in temperature testing and temperature dependent processing. The temperature program parameters controlled are rate of temperature change, soak time (time at a specific temperature), setpoint temperature, and deviation limits. In addition, three relays are provided for turning external devices on and off. Called "events", the function of the three relays is controlled by the segments of the program, as are setpoint and temperature.

In most temperature testing and temperature dependent processes, temperature is adjusted manually or with a set of cams that must be specially designed and controlled for the operation. The programmer provides temperature change functions automatically by carrying out the preprogrammed instructions in its nonvolatile memory.

The programmer has been designed for ease of use. A keypad is provided for entry of program parameters and lights indicate the program parameter and or program segment being displayed.

By executing temperature cycles automatically, a high degree of temperature reliability and precision is assured. Other safeguards include a keylock which permits program changes only when the key is in the re-program position, and a non-volatile memory capability that prevents loss of program memory in the event of a power failure.

2.0 FUNCTION.

2.1 GENERAL

The programmer determines the temperature controller setpoint through the rate/temperature/soak time program stored in its memory. The program may have up to 30 segments and may be repeated up to 9999 times before being automatically shut down. Multiple programs may be stored in memory, provided that the total number of segments plus program separators does not exceed 30.

A program review function allows the operator to sequentially step through all program parameters and observe them on the six-digit numeric display. The first two digits of the display are the program segment number, the last four represent the program function. A red LED corresponding to rate, setpoint, soak time, process deviation, or event status will also light during the program review.

2.2 EXTERNAL EVENTS

Relay closures are provided so that up to three external events may be activated by wiring to a terminal strip on the back of the programmer. When the event is turned on, the relay is closed.

3.0 SPECIFICATIONS.

Setpoint: -99.9 to +799.9

Temperature resolution: 0.1 degrees

Soak Time Resolution: 1 min.

Soak Time Duration: 1-9999 min.

Process Deviation Limits: ±2.0 to ±799.9 degrees

Program Segments: 30

Program Repeats: 0-9999

3.0 (Cont.)

Program Input: 16 key numeric pad

Indicators: Power On, Rate, Setpoint, Soak Time, Process Deviation Limits, Events, End of Program Cycles, and Start.

External Events: Three, controlled by relay closures.

Relays: 1/2 amp max., 120 VAC, non-inductive

Rate: 99.9 degrees/min. max Clear causes execution of a "step function" and is displayed as "-----".

3.1 OTHER FEATURES

3.1.1 Automatic Repeat Cycle: Allows selection of the number of times the preprogrammed temperature sequence is to be repeated (up to 9999).

3.1.2 Keypad: A keypad is provided for easy data entry, advance, backup, on, off, and clear functions.

3.1.3 Display: A six-digit LED display with the first two digits representing the segment number and the last four digits representing program functions.

3.1.4 Process Deviation Limits Alarm: Flashing LED on the front panel of the programmer indicates temperature deviation limit has been exceeded. An alarm output is also provided on the terminal strip on the back panel.

3.1.5 Hold Function: Allows the operator to stop a program and hold, to examine parameters, etc. without interrupting the sequence of program execution. Program execution resumes upon pressing the START button.

3.1.6 Temperature Program: A set of instructions that is stored in the memory of the programmer. It includes a series of temperature setpoints, rates of temperature change, time at which the temperature stays at a particular setting, process deviation limits, external event enable instructions.

3.1.7 Program Segment: One of a possible 30 segments of the complete temperature program. It includes rate, setpoint, soak time, process deviation limits, external event enable instructions, number of cycles, and an E.O.P. (end of program) separator segment.

3.1.8 Rate: The rate of temperature change expressed in degrees per minute.

3.1.9 Setpoint: The temperature at which the program will stay during the soak time.

3.1.10 Soak Time: A period of time during which the program stays at a pre-selected temperature. Expressed in minutes.

3.1.11 Process Deviation: The amount by which the temperature may deviate from the setpoint. The deviation is expressed in degrees and must be the same for positive and negative deviations.

3.1.12 Events 1-3: External events that are enabled when any of the three relays in the programmer are closed. These events are programmed into the temperature program.

4.0 SWITCHES & INDICATORS.

4.1 FRONT PANEL

4.1.1

Keypad:

0-9: For entry of numeric values into the program.

*: Used as a decimal point.

#: Used to enter a minus sign.

Advance: ("A" on keypad) used to advance program parameters displayed during program review.

Backup: ("B" on keypad) used to examine the previous parameter when reviewing the program.

NOTE

No information is stored unless the "DATA ENTRY" (D) key is pushed and the keylock is in the reprogram position. The displayed parameter is then stored in program memory.

Start: Push to start the temperature program.

Hold: Push to temporarily stop the program's execution. (Does not turn off heat/cool.) Program can be resumed by pushing START button.

End Cycle: Used to set the number of times the temperature program is to be executed and to define the end of the program.

Review: Push to review the stored Rate, Setpoint, Soak Time, Deviation, and Event functions.

Reset: Push to return to the first segment of the displayed program while in REVIEW or HOLD mode.

Keylock: Disables the "DATA ENTRY (D)" key to prevent program changes when in "Program Lock" position.

4.2 BACK PANEL

4.2.1 Power: Controls AC power to the programmer. This switch must be on at all times for the programmer to be operative.

4.3 INDICATORS

4.3.1 Power: Lights to indicate that power is on.

4.3.2 Start: Lights to indicate that the program is running.

4.3.3 Repeat: Lights to indicate that the number of program executions is displayed.

4.3.4 Review: Lights when the review mode is selected.

4.3.5 Program Functions LEDs: A separate LED for rate, setpoint, soak time, process deviation limits, and events. Each LED is turned on when the parameter corresponding to it appears on the display. The setpoint LED is turned on while the program approaches the setpoint, and the soak time LED turns on while the program is in the soaking segment.

5.0 PROGRAMMER SETUP.

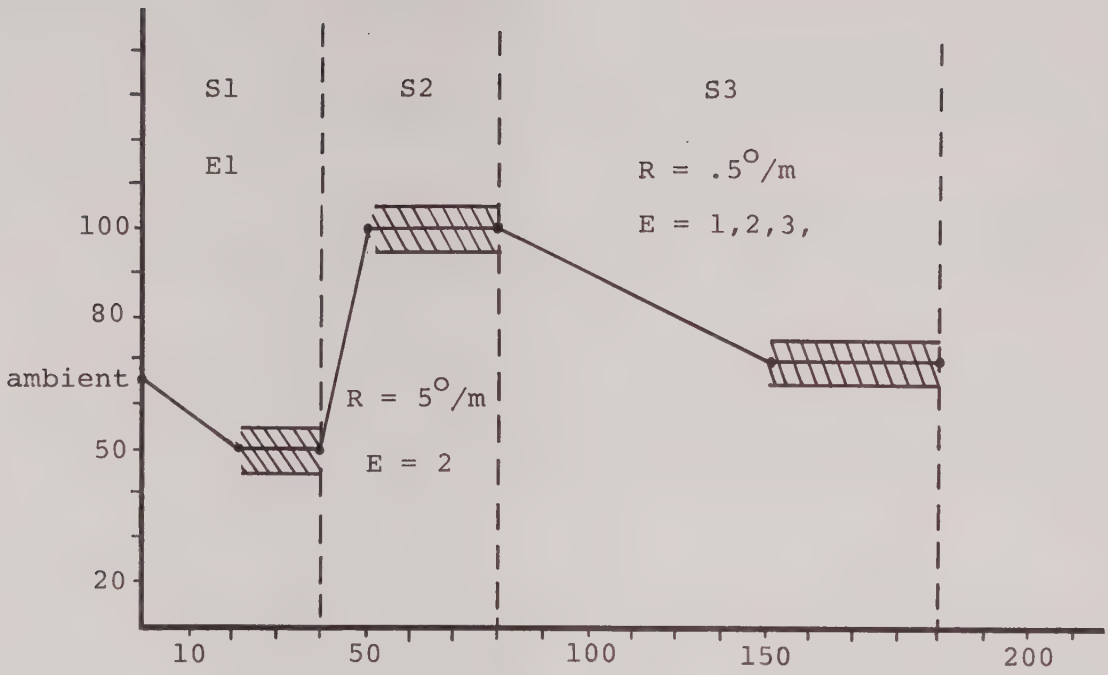
The programmer has the following modes: Start/ Run, Hold, Review, Reprogram, and End Program/ Cycles.

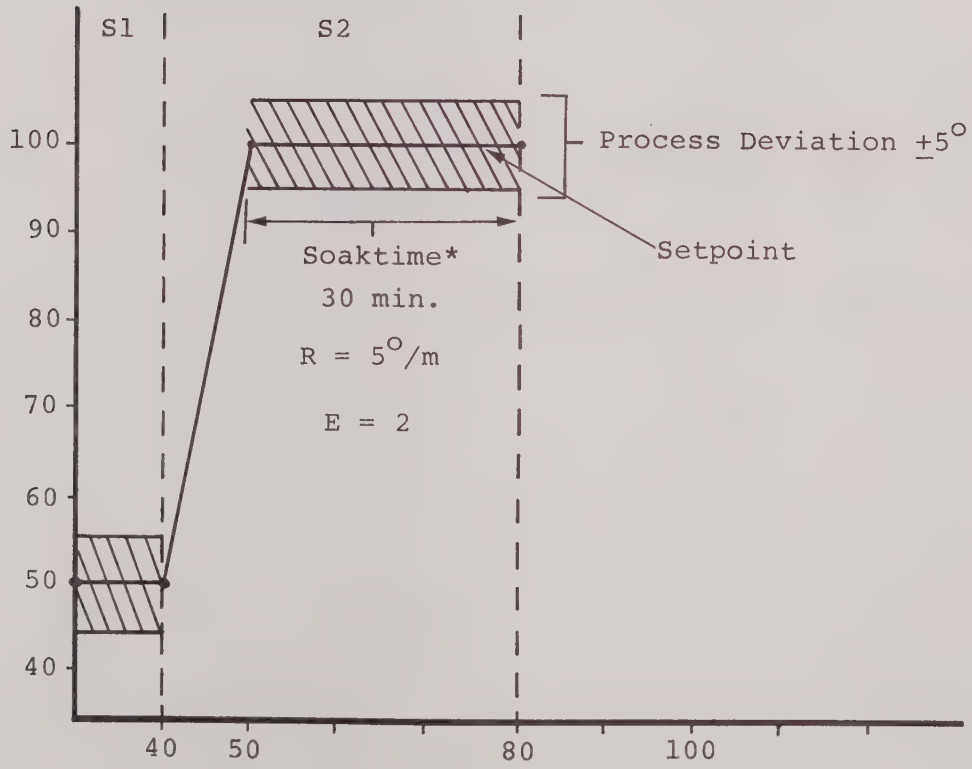
REPROGRAM

The Reprogram mode is the most important because it is in this mode that the data for the temperature program is entered into the microprocessor memory.

To write the temperature program, determine the desired setpoint temperatures, soak times, and rates of temperature change, process deviations, and any external events required. It is helpful to plot the temperature program on a chart as shown in Figure 1.

Having listed the functions for each program segment (up to 30, including the E.O.P. separator, are permitted), determine the number of times the temperature program is to be repeated. It is important to keep a written record of the temperature program. This will facilitate data entry into the programmer and be useful as a reference.





* Soak time begins when temperature is within 1.6° of setpoint on step function only (0.0 Rate).

Figure 1

5.2 ENTERING PROGRAM DATA

Before working with the programmer, be certain the Temperature Controller is in the "Remote" mode.

When the programmer is first turned on and the memory is blank, the stored functions will all display as E.O.P. (End of Program).

The thermal capabilities of the temperature environment should be known so that the rate of temperature change that is selected for each segment will be a rate that is possible to achieve.

The "rate" function in the first segment of the temperature program will start from ambient temperature. In the example in Fig. 1, segment #1 begins with a room ambient temperature of 24 degrees centigrade (75° F).

The program parameters include a process deviation of 5 degrees for all segments of the program. Soak times and temperature change rates vary, and various events are turned on for each program segment.

The program is to be repeated 4 times before it is automatically shut down.

5.2 (Cont.)

The program for this is as follows:

Segment 1:

Rate: 1 °/min.
Setpoint: 50 °
Soak time: 20 min.
Process Deviation: 50°
Events: 1

Segment 2:

Rate: 5 °/min.
Setpoint: 100°
Soak time: 30 min.
Process Deviation: 5°
Events: 2

Segment 3:

Rate: .5°/min.
Setpoint: 70 °
Soak time: 40 min.
Process Deviation: 5 °
Events: 1, 2, 3

Segment 4:

E.O.P. LP = 4

DATA ENTRY INSTRUCTIONS

The following procedure details data entry for the above sample program.

(If a program has been running, press HOLD.)

1. Put the keylock in the Reprogram position.

2. Make sure that power is on.

3. Press the REVIEW button.

4. The first segment of the program to be replaced and the RATE LED should be on. If not, press the RESET button.

5. Observe that the RATE LED is on. When this is on, enter the rate parameter for segment 1 on the keypad. A "1.0" will be displayed in the four-digit section of the display.

   If an entry error is made, press the CLEAR button and reenter.

6. When the display indicates the rate parameter desired, press the DATA ENTRY button, causing the displayed value to be stored in memory and automatically advancing to the next parameter to be entered.

7. The Setpoint LED will come on, indicating that the setpoint parameter can be entered.

8. Enter 50 on the keypad and push the DATA ENTRY button.

9. The Soaktime LED will come on. Enter 20 on the keypad and press the DATA ENTRY button.

10. The Process Deviation LED will come on. Enter 5 on the keypad and press the DATA ENTRY button.

NOTE

If no process deviation limit is desired for that segment, press the CLEAR button on the keypad, then press DATA ENTRY (dashes will be displayed).

11. To enter EVENTS, press CLEAR to reset any previously entered events, then enter "1". The display will show "1...E". Push the DATA ENTRY button.

12. The two-segment section of the display will now advance to 2. Proceed entering the EVENTS for segments 2 and 3.

13. After all data for all segments has been entered, push the END CYCLE button. The segment number is now replaced by "LP" for loops (i.e., cycles).

NOTE

Do not reset before pressing END CYCLE. The segment number displayed prior to entering END CYCLE will be interpreted as the end of the program sequence.

14. Enter 4 on the keypad for 4 repeats of the program. Push the DATA ENTRY button and the programmer will display the segment number of the first segment in the program, as it is automatically positioned at the start of the program. Turn the keyswitch to the Program Lock position.

6.0 RUNNING THE PROGRAM.

To run the program, simply push the START button. The key can only be removed in the PROGRAM LOCK position.

When the START button is pushed, the program will start at the beginning of the segment displayed when the key switch was turned to the PROGRAM LOCK position. This feature allows the program to be started at any segment by entering the REPROGRAM MODE and advancing the segment number to the desired starting point. This feature also allows multiple programs to be stored in memory and selectively executed by calling up the starting segment number in the REPROGRAM MODE then, turning the keyswitch to the PROGRAM LOCK position.

While the program is running, the display will indicate the segment number and the LED beside the START button will be on. The program function LEDs will indicate what is shown in the Program Function section of the display.

While the temperature is changing to reach the soak temperature, the setpoint LED will be on and the display will indicate the actual setpoint transmitted to the controller. Process deviation is monitored at all times except during a step function if a deviation limit is programmed.

Soak time begins when the temperature is within 1.6 degrees of the setpoint. At this time, the SETPOINT LED will go off and the SOAK LED will come on. The display will show the soak time remaining in the segment. During the soak time, process deviation is monitored. If the deviation limit is exceeded, the PROCESS DEVIATION LED will flash, a contact closure will be present on pins 7 and 8 of the terminal strip on the rear panel and the program will stop. The program can be restarted by pushing the START button.

6.0 (Cont.)

When the program has been completed, the programmer will automatically shut off the temperature controller, and E.O.P. will appear on the display. The programmer will then stay in the HOLD mode until restarted.

7.0 PROGRAM MODES.

7.1 RESET

To stop a program and restart it at the beginning, push the HOLD and then the RESET buttons. This returns the program to segment 1. Push the START button to begin program execution.

7.2 REVIEW

Program functions may be reviewed by pressing the REVIEW button. The advance and backup buttons can be used to step through the program. Program execution must have been halted previously by pressing HOLD. The REVIEW LED will be on.

When START is pressed and the keyswitch has remained in the PROGRAM LOCK position, the program will continue from the segment where it was halted. If the keyswitch is in the RE-PROGRAM position during review,the program will restart from the segment shown on the display at the time it is returned to PROGRAM LOCK position.

7.3 CYCLES

Cycles are the number of times a program is repeated and is the last step in program entry.

No Repeats enter "0"

Repeats up to 9999 are possible

If less than 30 program segments are used, the end of the sequence is defined by entry of the cycles function.

7.3 (Cont.)

A built-in counter decrements each time the program is repeated. When the HOLD and then the CYCLE buttons are pressed, the number of remaining cycles, including the one currently being executed, is displayed.

7.4 HOLD

The HOLD mode can be used to temporarily stop the program. During this mode, the setpoint, soak timer, and cycles counter are maintained at the point where the HOLD button was pushed.

To resume the program, push the START button, and the program will continue at the segment where it was stopped.

7.5 PROCESS DEVIATION

A Process Deviation limit function in the programmer monitors the actual temperature during soak time. The magnitude of the deviation limit is programmable for each of the program segments; the positive and negative deviation limits must be the same.

In the case of a "Step Change of Setpoint", i.e. "...." Rate function, Deviation limits are only monitored after the process temperature has approached to within 0.4 degrees of the new Setpoint.

The minimum deviation limit is 2 degrees; maximum deviation is 799.9 degrees.

If Process Deviation monitoring is not required for a program segment, it must be "cleared" by the "CLEAR key" ("C" key on the keypad) followed by the "ENTER key".

When no Process Deviation function has been selected, the display will show four dashes (----) when the Process Deviation LED is on.

7.6 EXTERNAL EVENTS

Three relays in the programmer allow control of external events. Any combination of the three relays may be used with each program segment. The events to be turned on are entered for each program segment.

When the segment is running, the selected events will be on, i.e., the relays will be closed. The selected events will remain ON (even in HOLD mode) until the next segment is executed.

7.7 PROGRAMMING EVENTS

The keyswitch must be in the RE-PROGRAM position.

The Events are programmed as a function in each segment when the EVENT LED is ON. Enter the number of each "ON" event via the keypad, and then press the DATA ENTRY button.

The right-hand position of the display will contain an "E" and the remaining segments will show which events are ON.

Pushing the CLEAR button turns OFF the events displayed, but does not alter the memory until the DATA ENTRY button is finally pushed.

All events remain in this last state at the end of the program.

7.8 END OF PROGRAM

The programmer automatically shuts off at the end of the program sequence. Power remains on to protect the memory, and E.O.P appears on the display.

E.O.P. is determined when the last segment of the sequence is completed and the repeats counter has reached zero.

To restart, press the START button. The previously programmed number of cycles will again be executed.

7.9 PROGRAM REVIEW

After the program has been entered it is a good idea to review it to assure that all data has been correctly entered.

To review, be sure key switch is locked and press the REVIEW button. The display will indicate the program segment and the numbers shown in the Program Function portion of the display will correspond to the function indicated by the LED that is on. To step through all parameters, push the ADVANCE button. This will advancce the display successively through all parameters. Holding the "A" or "B" button down slews the program through the segments.

7.10 MALFUNCTION

If the temperature controller malfunctions for any reason, such as an open probe, exceeded temperature limits, or if it is not in the remote mode, program execution will abort, and the display on the programmer will show four dashes (----) until the malfunction or error condition is corrected.

8.0 REPROGRAMMING.

8.1 ENTERING A NEW PROGRAM

Before entering a new program, turn the keyswitch to RE-PROGRAM and advance or backup to the desired location of the first segment of the new program.

8.2 TO CHANGE EXISTING PROGRAM DATA

Put the keyswitch in the RE-PROGRAM position. If running, press HOLD and REVIEW. Then advance or backup to the desired segment. Change the data by pressing the appropriate keys and the DATA ENTRY button.

9.0 NON-VOLATILE MEMORY.

Battery backup is not required as the program information is stored in the non-volatile memory. A power fail detection circuit in the system senses loss of AC power and allows the microcomputer to store the pertinent information before the power is lost completely.

After a power failure, during program run, operation will continue from where it left off. If not "running" at the time of power failure, the programmer operation will be identical to an initial power-up situation, but the program memory will be preserved. The programmer will come up in REVIEW mode, displaying the first function of the program sequence.

If power is returned and the memory has not been preserved, the display will read HELP. Program data must then be reentered.

In the event of a "brown out" or momentary decrease of power to the programmer or line transient, the memory will be preserved and the temperature program will automatically be continued from the point at which it was interrupted.

DELTA DESIGN

PROGRAM WORK SHEET

DATE: _____

PROGRAM: _____

SEG. NO.	RATE °C/MIN.	SETPOINT °C	SOAK TIME (MIN)	PROCESS DEVIATION LIMITS (±°C)	EVENTS		
					#1	#2	#3
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
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29							
30							

ADDITIONAL PROGRAM REPEATS: _____

REMARKS: _____

DELTA DESIGN

PROGRAM WORK SHEET

DATE: _____

PROGRAM: _____

SEG. NO.	RATE °C/MIN.	SETPOINT °C	SOAK TIME (MIN)	PROCESS DEVIATION LIMITS (±°C)	EVENTS		
					#1	#2	#3
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
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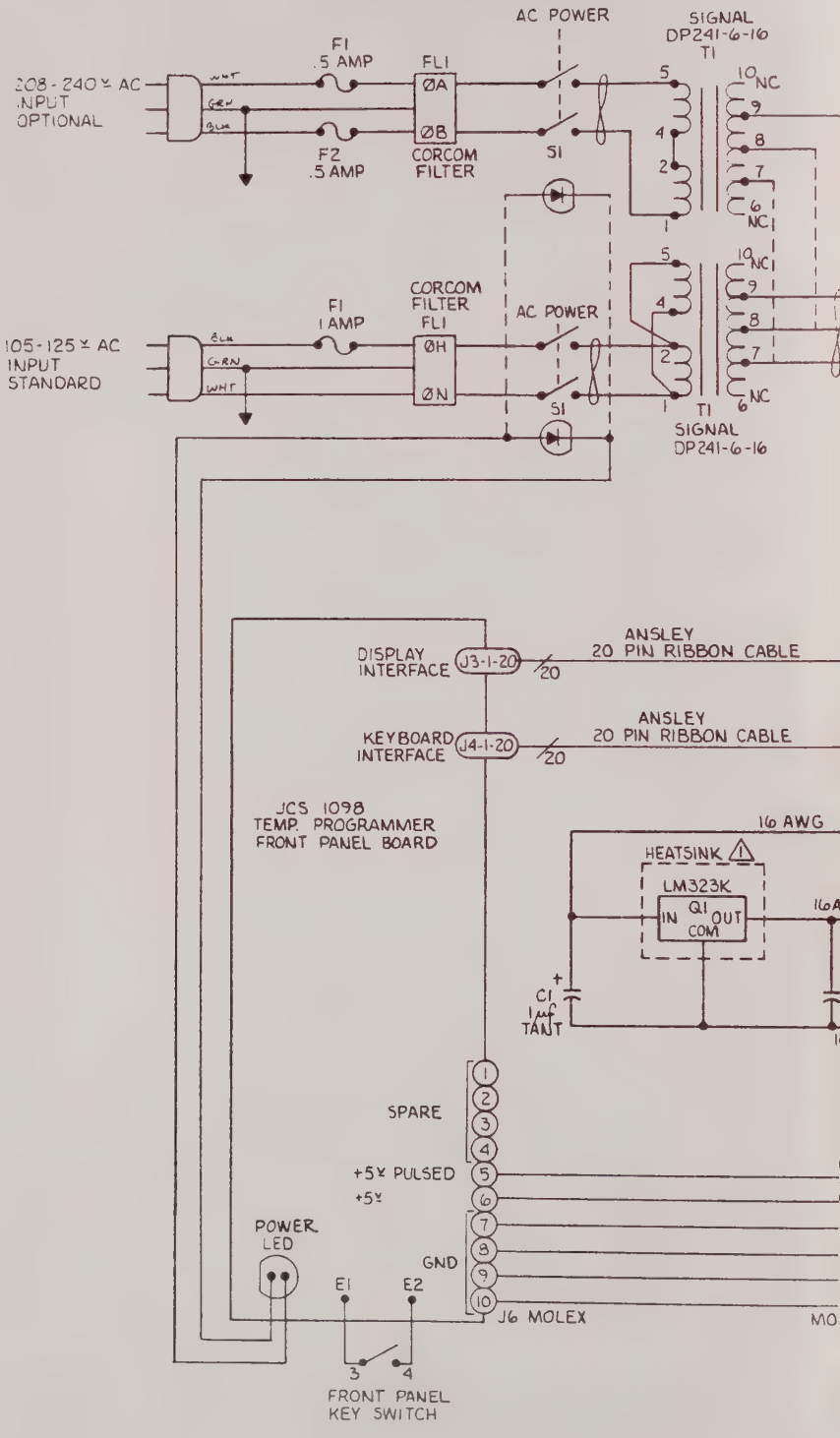
REMARKS: _____



3. PART NUMBERS ARE FOR REPLACEMENT INFORMATION. EQUIV OR HIGHER QUALITY MAY BE SUBSTITUTED

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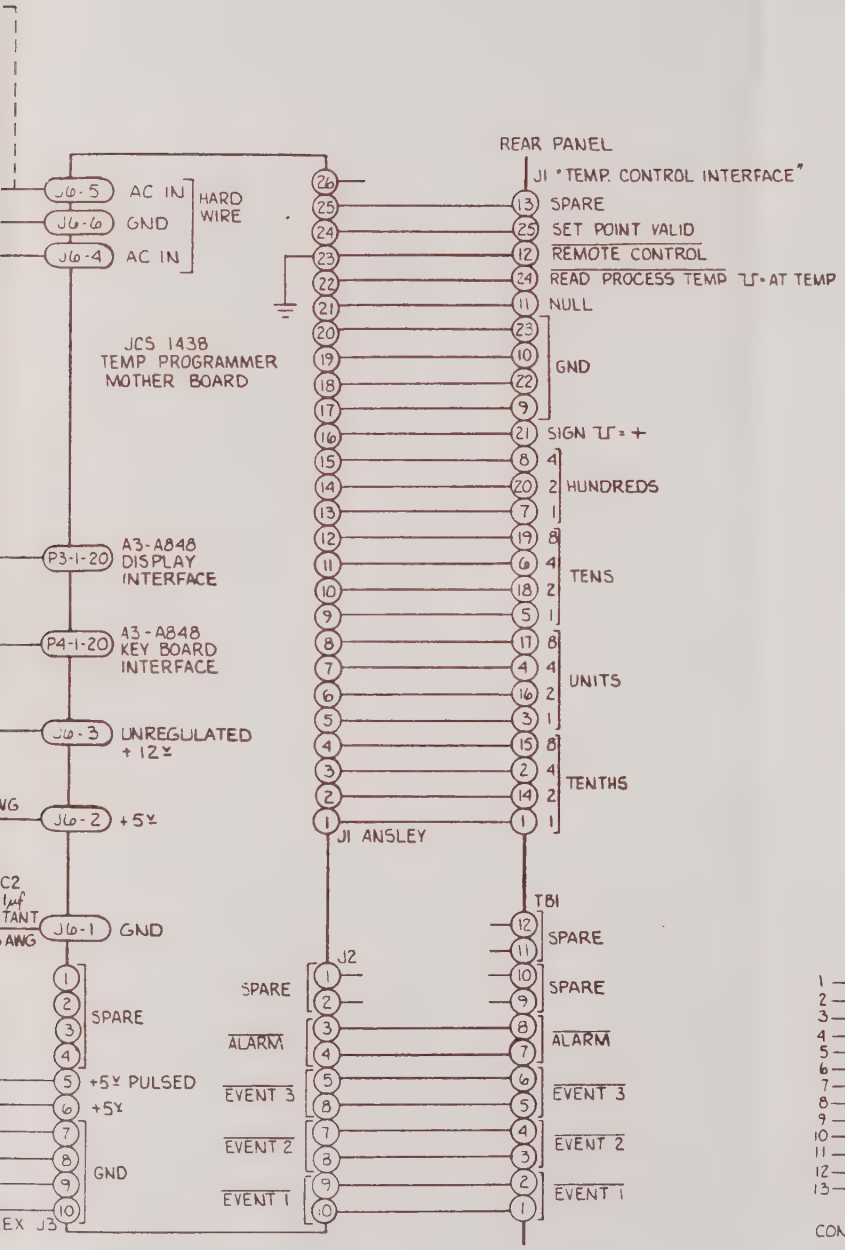
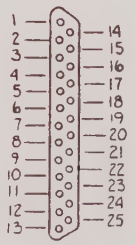
NOTES: UNLESS OTHERWISE SPECIFIED

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	A	PER ECN 3883 J6-5 WAS E1, J6-6 WAS E3, J6-4 WAS E2, J6-3 WAS E4 J6-2 WAS E5 J6-1 WAS E6	4/11/83	DBS





CONNECTOR J1
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"FEMALE"

MADE FROM JCE 1441

	REF	10506081	9385				
DASH	QTY	NEXT ASSY	USED ON	SERIAL NO.	DATE EFF	DWG REV	
APPLICATION				EFFECTIVITY			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: .XX ± .03, .XXX ± .010
ANGLES: 0°30'

HOLE TOLERANCES

.013 THRU .128	+.004 −.001	.251 THRU .500	+.004 −.001
.126 THRU .250	+.005 −.001	.501 THRU .750	+.008 −.001

MATERIAL ⚠1
FINISH ⚠2

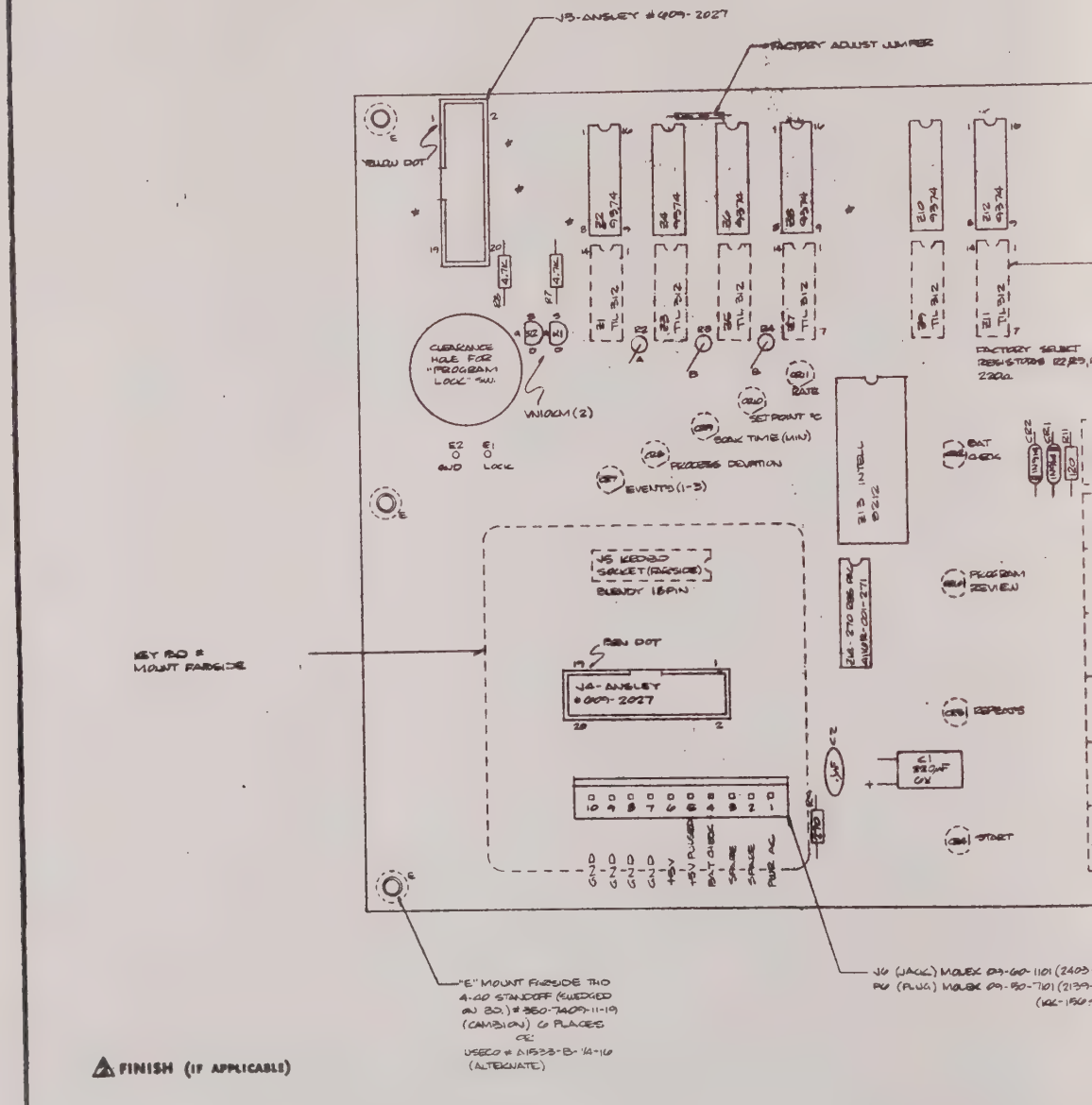
ENGINEERING ACTIVITY	
3875	
DESIGN	
DRAFTED	1-11 83
CHECKED	1/11/83
APPROV	
RELEASE	
DO NOT SCALE DWG	

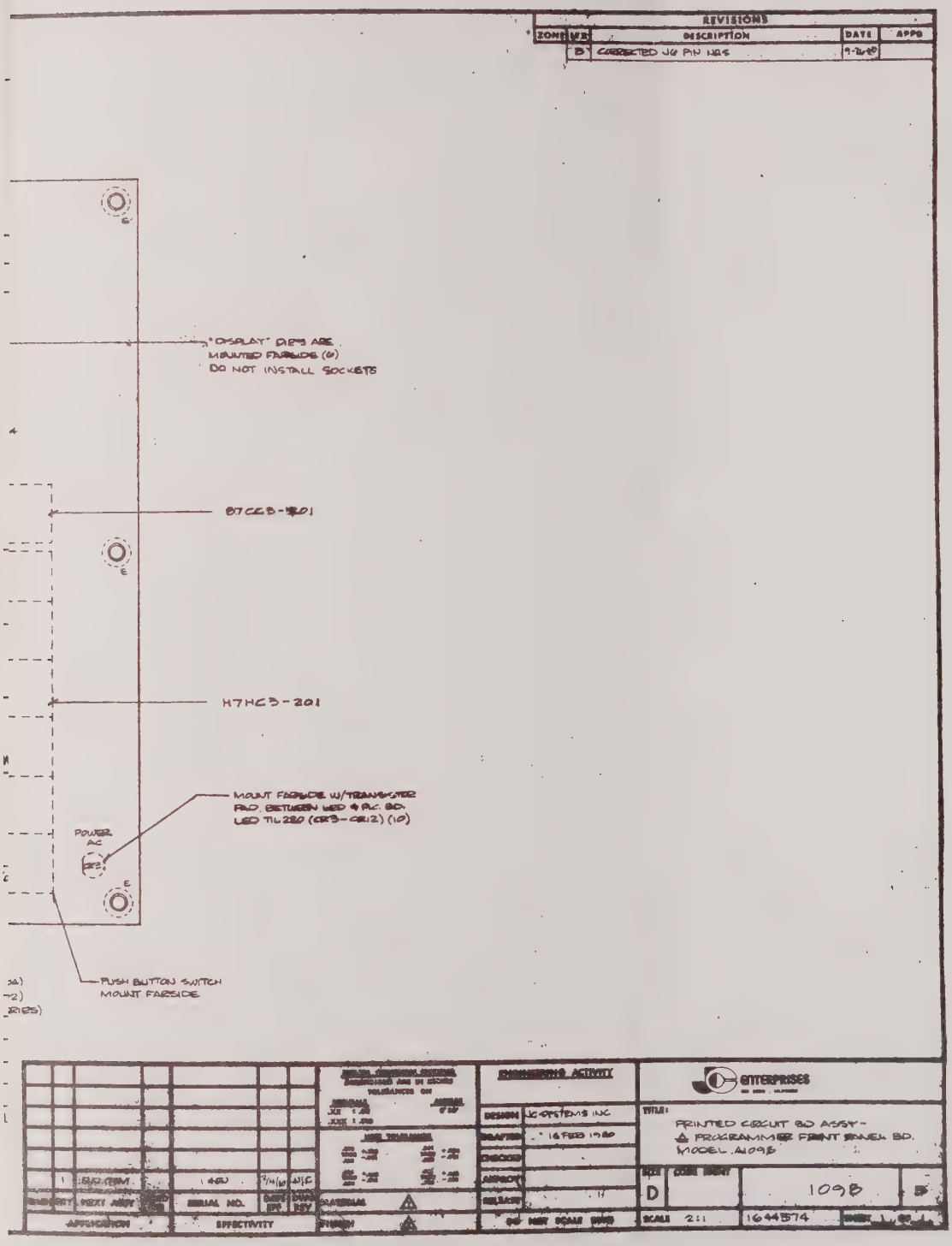
DELTA DESIGN INC.
A SUBSIDIARY OF COMU INC.
SAN DIEGO, CA. 92123

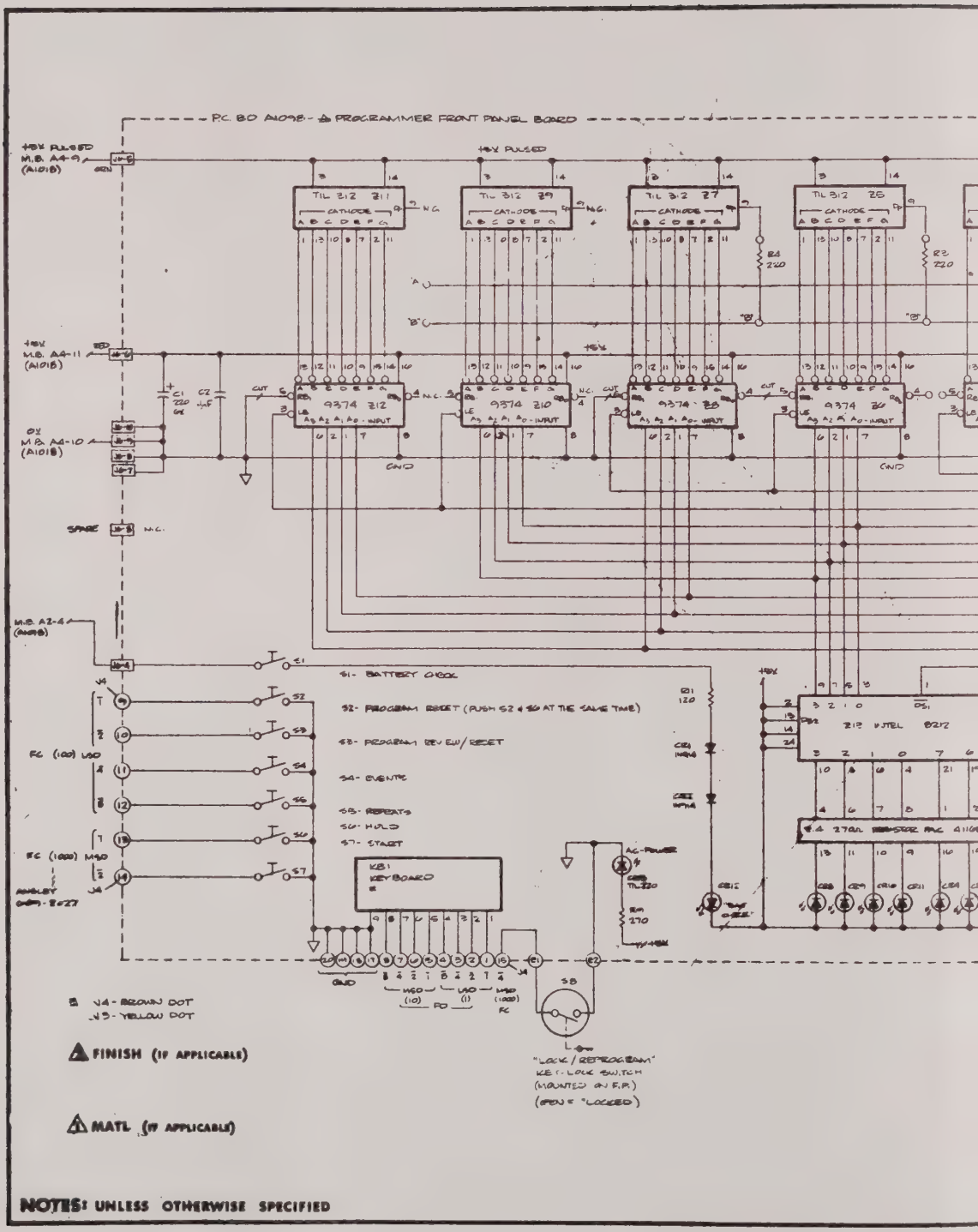
TITLE: SYSTEM WIRING DIAGRAM
TEMPERATURE PROGRAMMER
MODEL 9385

SIZE	CODE IDENT		REV
D		1654877	A

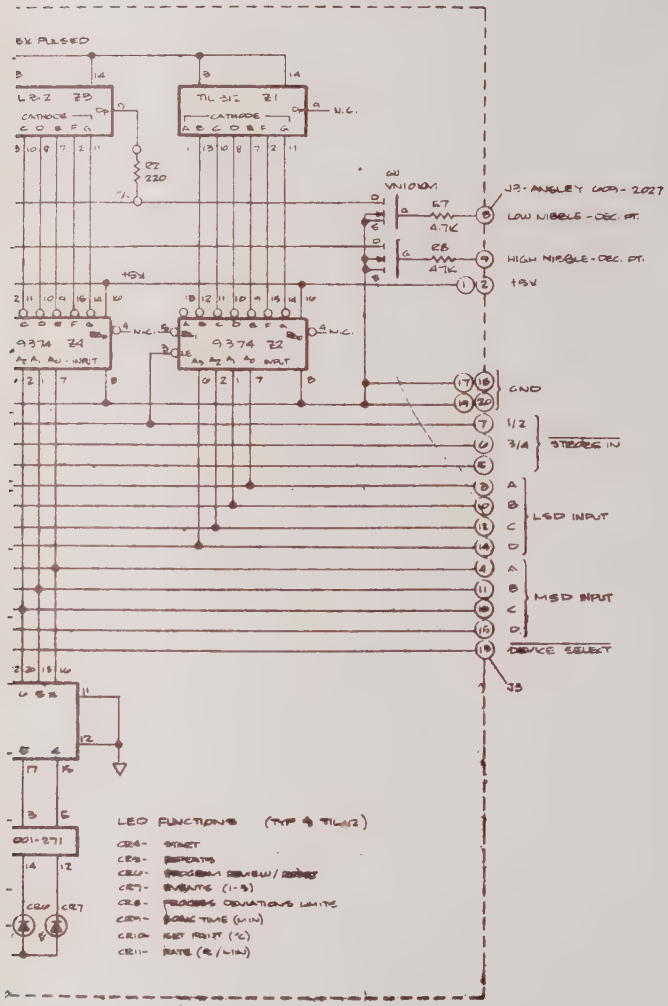
SCALE -/- 21 SHEET 1 OF 1


J5-ANSLEY #609-2027
FACTORY ADJUST JUMPER
YELLOW DOT
CLEARANCE HOLE FOR "PROGRAM LOCK" SW.
VARIOHM (2)
LOCK
FACTORY SELECT
SET POINT °C
BOOK TIME (MIN)
PROCESS DEVIATION
EVENTS (1-3)
BAT CHECK
PROGRAM REVIEW
REPEATS
START
J5 KEYED SOCKET (REVERSE) BLENDY 18PIN
KEY PIN # MOUNT REVERSE
PIN DOT
J4-ANSLEY #609-2027
GND GND GND GND +5V +5V PLUGGED BAT CHECK SPARE SPARE PWR AC
"E" MOUNT FIRESIDE THD 4-40 STANDOFF (EMBEDDED ON 30.) #350-7409-11-19 (CAMBION) 6 PLACES OR: USECO # A1533-B-1/4-10 (ALTERNATE)
J6 (JACK) MOLEX 09-60-1101 (2403
PU (PLUG) MOLEX 09-50-7101 (2139
FINISH (IF APPLICABLE)
MATL (IF APPLICABLE)
NOTES: UNLESS OTHERWISE SPECIFIED


REVISIONS
ZONE | LTR | DESCRIPTION | DATE | APPD
B | CORRECTED J6 PIN NOS | 9-26-80
"DISPLAY" DIP'S ARE MOUNTED FARSIDE (6) DO NOT INSTALL SOCKETS
87CC3-1201
H7HC3-201
MOUNT FARSIDE W/TRANSISTOR PAD BETWEEN LED & P.C. BD. LED TIL 220 (CR3-CR12) (10)
POWER AC
CR3
PUSH BUTTON SWITCH MOUNT FARSIDE
ENGINEERING ACTIVITY
DESIGN
DRAFTING
CHECKED
APPROVED
RELEASED
DO NOT SCALE PRINT
DESIGN LC SYSTEMS INC
DRAFTING 16 FEB 1980
ENTERPRISES
TITLE: PRINTED CIRCUIT BD ASSY- PROGRAMMER FRONT PANEL BD. MODEL A1098
SIZE D
CODE IDENT
1098
SCALE 2:1
16445T4
SERIAL NO.
EFFECTIVITY

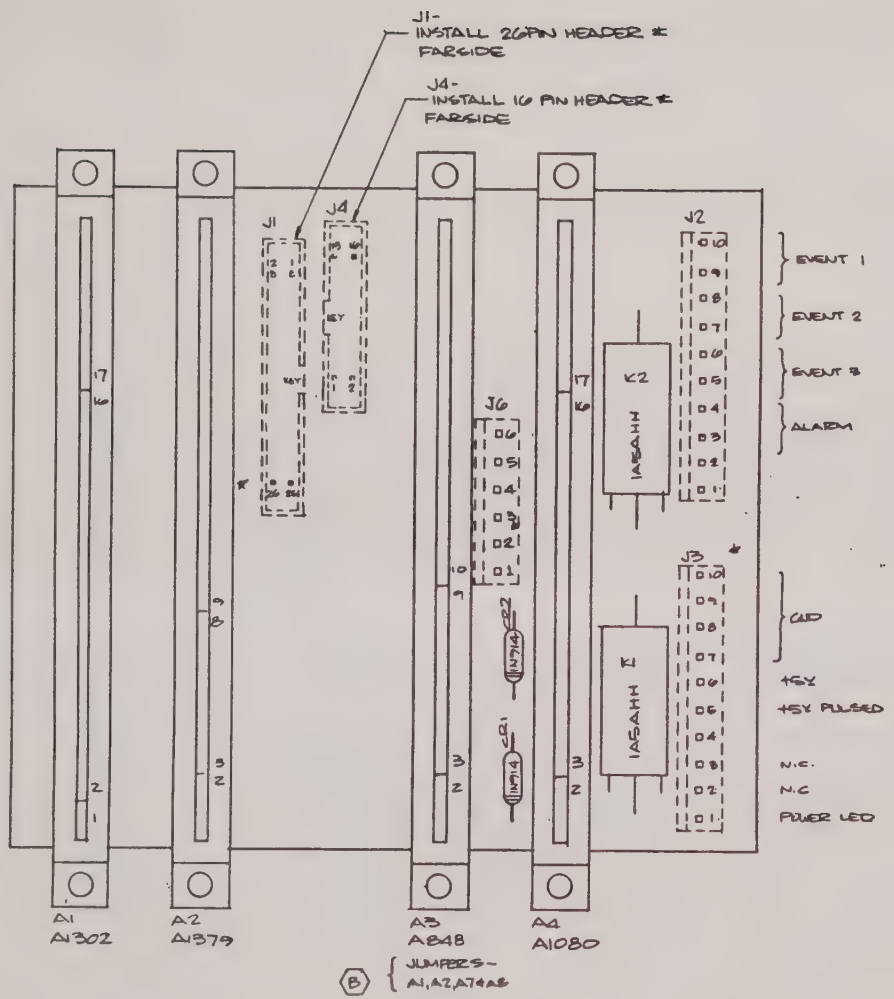

P.C. BD A1098 - PROGRAMMER FRONT PANEL BOARD
+5V PULSED
M.B. A4-9
(A1018)
+5V
M.B. A4-11
(A1018)
0V
M.B. A4-10
(A1018)
SPARE
N.C.
M.B. A2-4
(A1018)
TIL 312
CATHODE
9374
INPUT
GND
S1- BATTERY CHECK
S2- PROGRAM RESET (PUSH S2 & S6 AT THE SAME TIME)
S3- PROGRAM REVIEW/RESET
S4- EVENTS
S5- REPEATS
S6- HOLD
S7- START
FC (100)
FC (1000)
KB1
KEYBOARD
AC POWER
270
"LOCK/REPROGRAM"
KEY-LOCK SW. TCM
(MOUNTED ON F.P.)
(OPEN = "LOCKED")
J4 - BROWN DOT
J5 - YELLOW DOT
FINISH (IF APPLICABLE)
MATL (IF APPLICABLE)
NOTES: UNLESS OTHERWISE SPECIFIED

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	D	CORRECTED W# PIN NO.S	4-24-80	



					ENGINEERING ACTIVITY	ENTERPRISES	
					DESIGN: W. SYSTEMS INC	TITLE: PRINTED CIRCUIT BD. SCH— PROGRAMMER FRONT PANEL BD. MODEL A109B	
					DRAFTING: " 14 FEB 1980		
					CHECKED:		
					APPROV:		
					RELEASE:	SIZE: D	CODE IDENT: 1097
1	A109D	190		MC	DO NOT SCALE DWG	SCALE: 2:1	1644573
BASED ON	NEXT ASSY	SERIAL NO.					
APPLICATION		EFFECTIVITY					

REVISIONS			
ZONE	LTR	DESCRIPTION	DATE	APPD



— P.C.BS. THIS MODULE —
A1 A1302 SUPER MICRO COM
A2 A1379 RAM SAVE MEMORY
A3 A848 PANEL INTERFACE
A4 A1080 PROGRAMMER UTILITY BD.

Part numbers are for replacement information. Equivalent or higher rated components may be substituted.

⚠ FINISH (IF APPLICABLE)

⚠ MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

DASH	QTY	NEXT ASSY	USED ON
	1	END ITEM	

APPLICATION

SERIAL NO. | DATE EFF | DWG REV

1 ON | 9/10/79 | N/C

EFFECTIVITY

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: .XX ± .03, .XXX ± .010
ANGLES: 0°30'

HOLE TOLERANCES

.013 THRU .125	+.004 −.001
.126 THRU .250	+.006 −.001
.251 THRU .500	+.004 −.001
.501 THRU .750	+.006 −.001

MATERIAL ⚠
FINISH ⚠

ENGINEERING ACTIVITY

DESIGN	K SYSTEMS INC
DRAFTED	10 AUG 1979 MT.
CHECKED	
APPROV	
RELEASE	

DO NOT SCALE DWG

ENTERPRISES

TITLE: PRINTED CIRCUIT BD ASSY— TEMPERATURE PROGRAMMER MTHR BD MODEL A1438

SIZE	CODE IDENT	
C		A1438

SCALE 2:1 | 1644561 | SHEET 1 OF 1

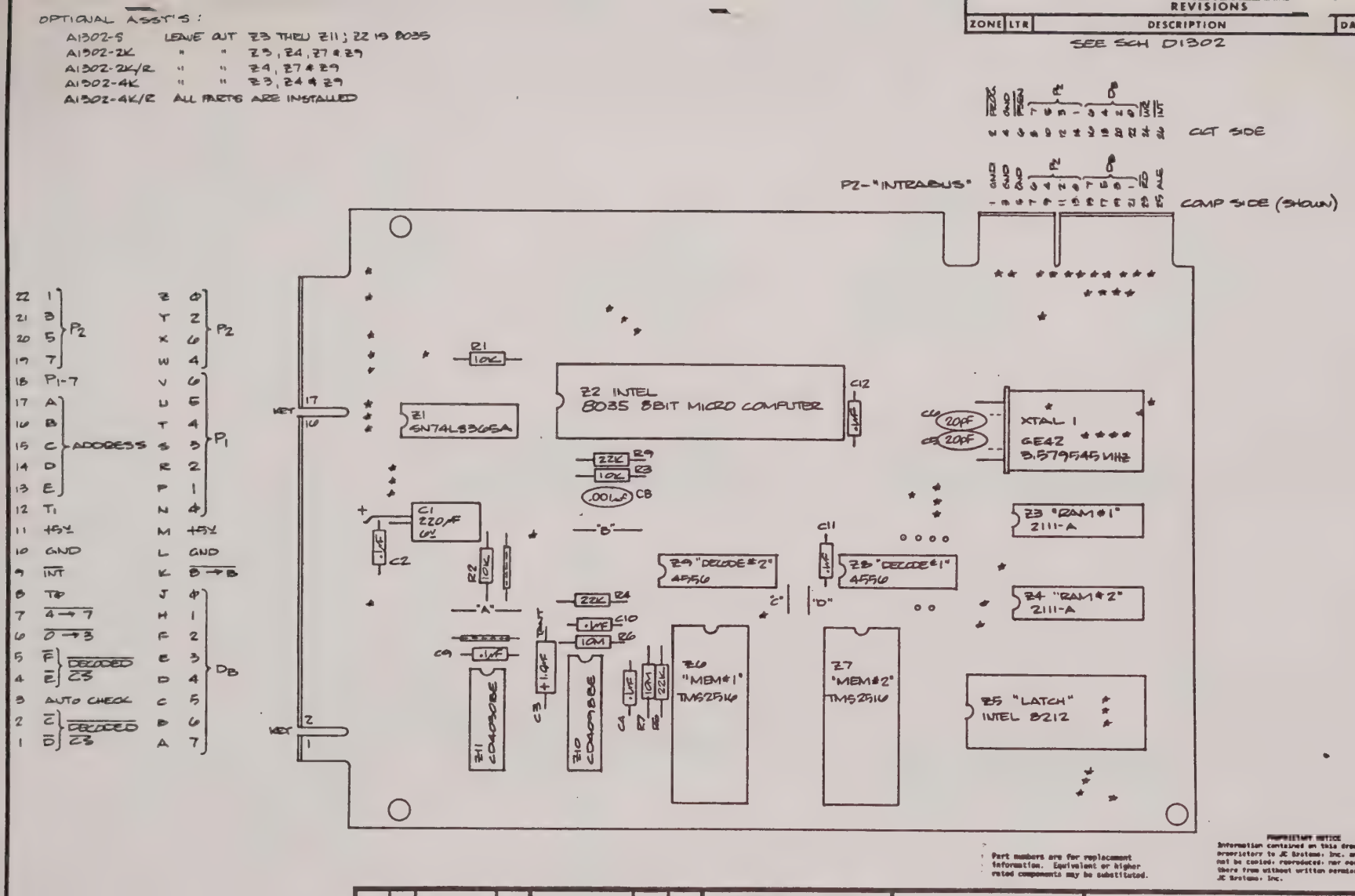
OPTIONAL ASST'S:

A1302-5	LEAVE OUT	Z3 THRU Z11; Z2 IS 8035
A1302-2K	" "	Z5, Z4, Z7 & Z9
A1302-2K/R	" "	Z4, Z7 & Z9
A1302-4K	" "	Z3, Z4 & Z9
A1302-4K/R	ALL PARTS ARE INSTALLED	

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPD

SEE SCH D1302



* Part numbers are for replacement information. Equivalent or higher rated components may be substituted.

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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON		ENGINEERING ACTIVITY	JC SYSTEMS, INC.
DECIMALS: .XX ± .03; .XXX ± .010	ANGLES: 0°30'	DESIGN: JC SYSTEMS INC	TITLE: PRINTED CIRCUIT BD ASST— SUPER MICRO CAM MODEL A1302-2K; 2K/R; 4K; 4K/R
HOLE TOLERANCES: .013 THRU .125 +.004 −.001; .126 THRU .250 +.005 −.001; .251 THRU .500 +.006 −.001; .501 THRU .750 +.008 −.001		DRAFTED: " 12JAN1981	
		CHECKED:	
		APPROV:	
		RELEASE:	

DASH	QTY	NEXT ASSY	USED ON	SERIAL NO.	DATE EFF	DWG REV
	1	END ITEM		1 & UP	1/14/81	NIC
APPLICATION				EFFECTIVITY		

MATERIAL ⚠1

FINISH ⚠2

DO NOT SCALE DWG

SIZE C | CODE IDENT | 1302 | A2

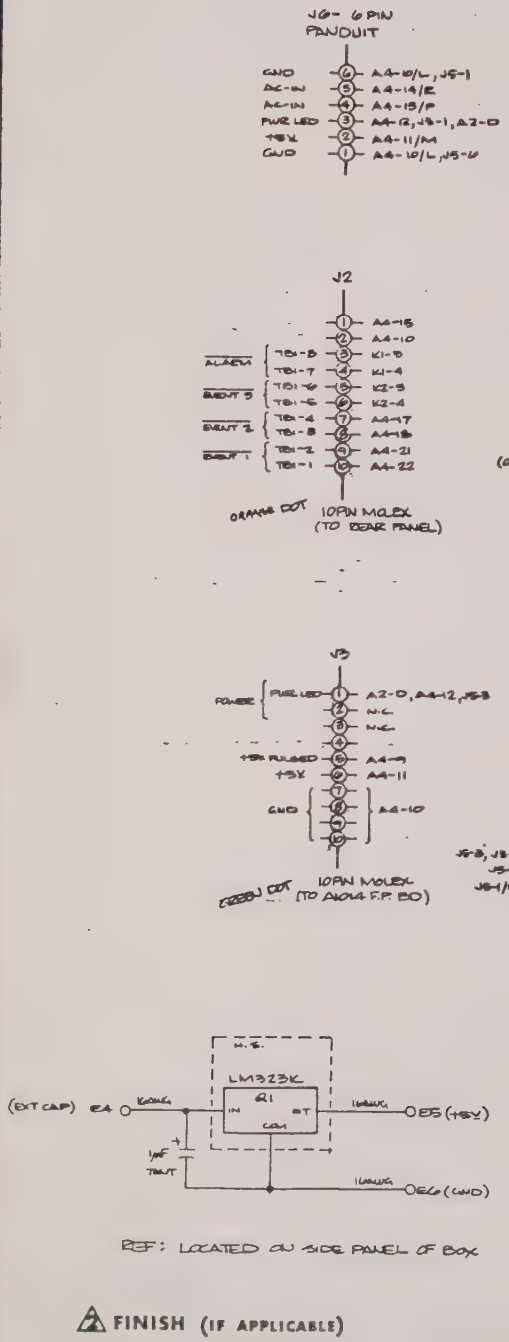
SCALE 2:1 | 1644591 | SHEET 1 OF 1

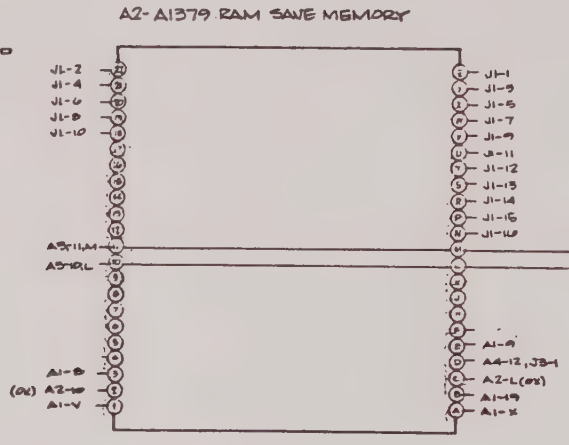
⚠ FINISH (IF APPLICABLE)

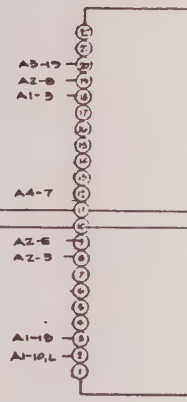
⚠ MATL (IF APPLICABLE)

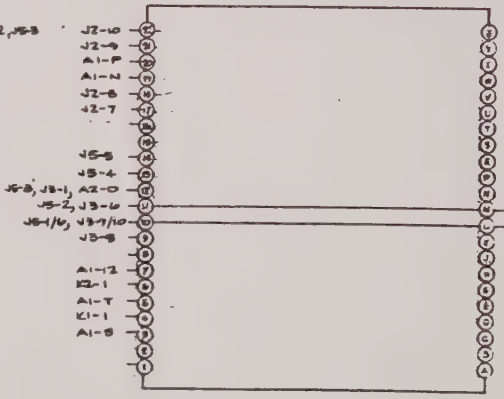
NOTES: UNLESS OTHERWISE SPECIFIED

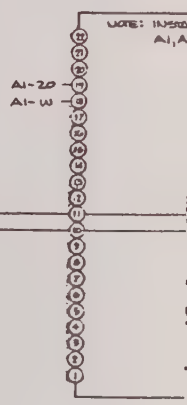
26



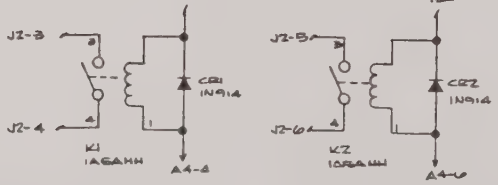








REF: LOCATED ON SIDE PANEL OF BOX



⚠2 FINISH (IF APPLICABLE)

⚠1 MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD

"DMS USED"
TER/SLAVE 1° CONTROL
CONTROL
CONTROL
LVIN .1° CONTROL

SUPER MICRO CAM

A2-A
A3-B
A2-1
J1-24
A4-6
A4-5
J1-22
A4-20
A4-19
+5V
J1-17,18,19,20

PANEL INTERFACE

ALL JUMPERS:
2,A7,A8

A2-11,M
A2-10,L

J1 "TEMPERATURE CONTROLLER INTERFACE"

A1-U	28	SET POINT VALID
A1-10,L	27	REMOTE CONTROL
A1-R	26	READ PROCESS TEMP "1" AT TEMP
A1-W	25	PULL
A1-10,L	24,23,22,21	GND
A2-N	20	+10V "1" = +
A2-P	19	4
A2-E	18	2 HUNDREDS
A2-S	17	1
J4-1, A2-T	16	8
J4-2, A2-U	15	4
J4-3, A2-16	14	2 TENS
J4-4, A2-V	13	1
J4-5, A2-19	12	8
J4-6, A2-W	11	4
J4-7, A2-20	10	2 UNITS
J4-8, A2-X	9	1
J4-9, A2-21	8	8
J4-10, A2-Y	7	4
J4-11, A2-22	6	2 TENTHS
J4-12, A2-Z	5	1

26 PIN HEADER

J4 "

J1-2	16	
J1-1	15	
GND	14	GND
GND	13	GND
+5V	12	+5V
+5V	11	+5V
J1-3	10	
J1-4	9	
J1-5	8	0
J1-6	7	1
J1-7	6	2
J1-8	5	3
J1-9	4	4 BIT
J1-10	3	5
J1-11	2	6
J1-12	1	7

J4 16 PIN HEADER

Part numbers are for replacement information. Equivalent or higher rated components may be substituted.

	1	A08		2 & ON	1-8-80	A	
DASH	QTY	NEXT ASSY	USED ON	SERIAL NO.	DATE EFF	DWG REV	
APPLICATION				EFFECTIVITY			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± .03, .XXX ± .010
ANGLES 0°30'
HOLE TOLERANCES
.073 THRU .125 +.004 -.001
.126 THRU .250 +.005 -.001
.251 THRU .500 +.006 -.001
.501 THRU .750 +.008 -.001
MATERIAL
FINISH

ENGINEERING ACTIVITY

DESIGN	V.C. SYSTEMS INC
DRAFTED	"10 AUG 1979 MT.
CHECKED	
APPROV	
RELEASE	

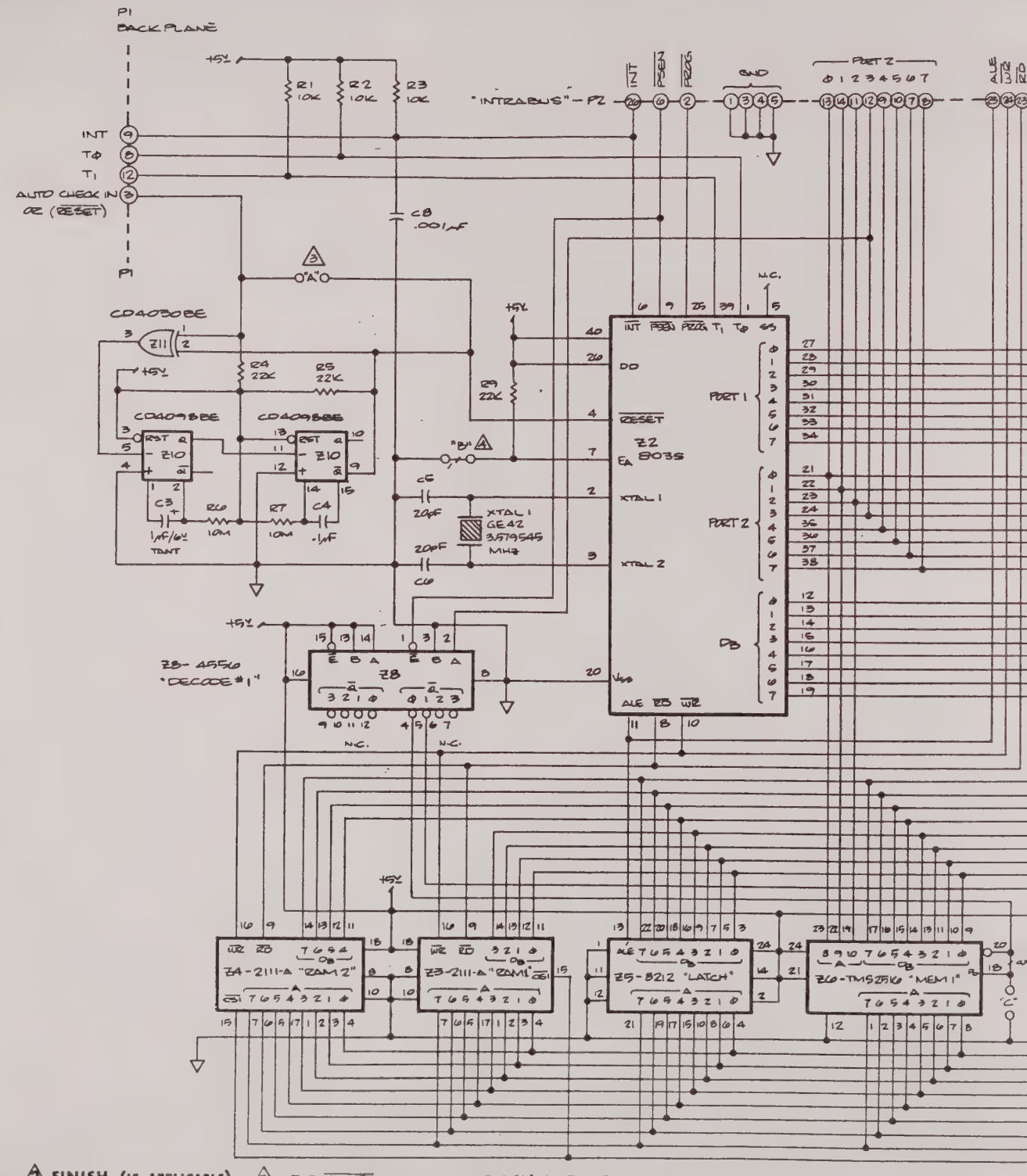
DO NOT SCALE DWG

ENTERPRISES

TITLE: PRINTED CIRCUIT BD SCH - TEMPERATURE PROGRAMMER MTHR BD. MODEL A1438

SIZE	CODE IDENT	
D		A1437

SCALE N.A. 1644560 25 SHEET 1 OF 1



2 FINISH (IF APPLICABLE)

1 MATL (IF APPLICABLE)

3 FOR RESET INSTALL JUMPER "A" & REMOVE Z10 & Z11.
FOR "AUTO CHECK IN" INSTALL Z10 & Z11, DO NOT INSTALL JUMPER "A"

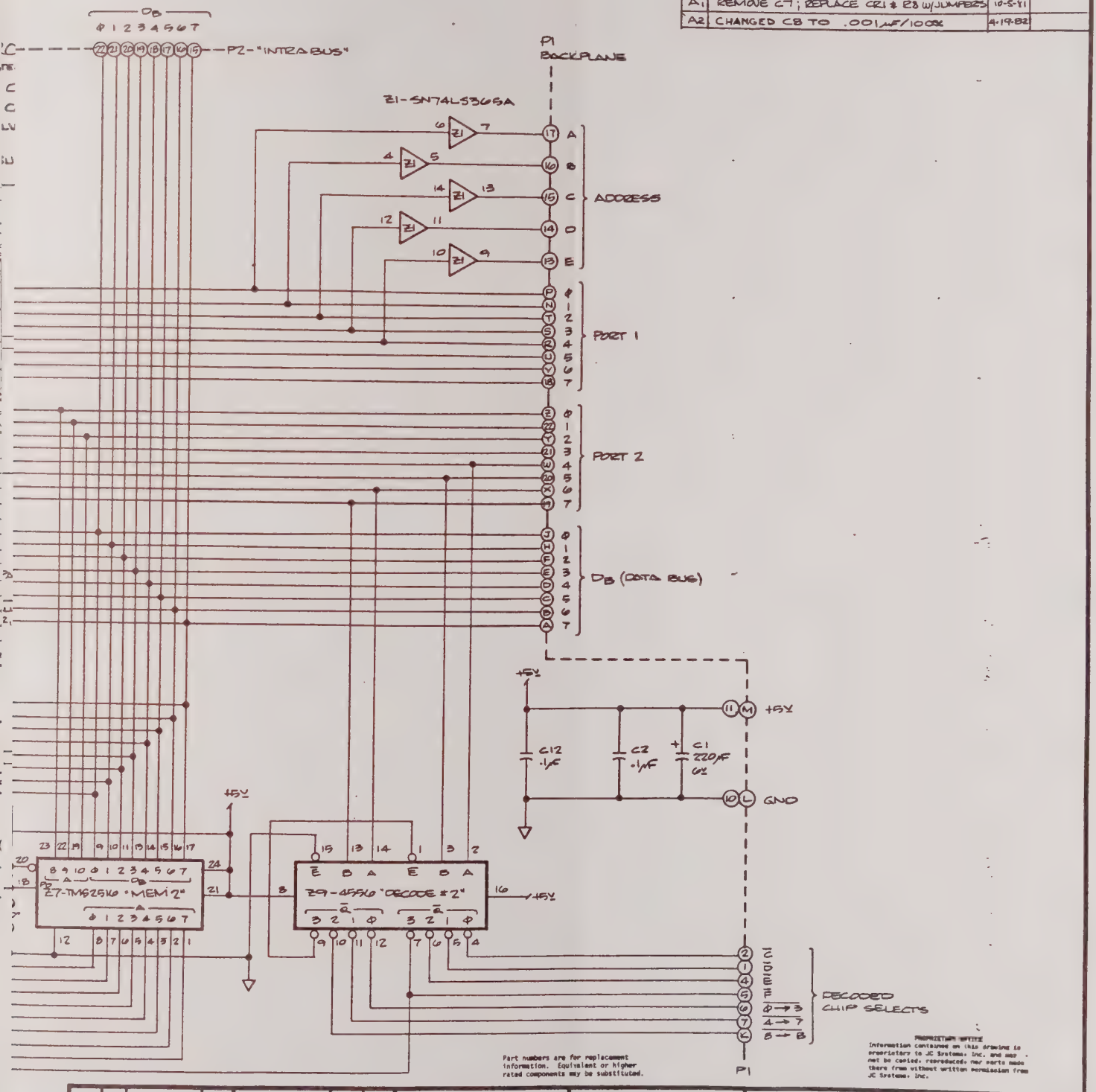
4 CUT STRAP WHEN USING 8035 (Z2)

5 OPTIONAL ASSY'S:

A1302-8	LEAVE OUT Z3 THRU Z11; Z2 IS 8035	—A1302-8 "STATIC MEMORY"
A1302-2K	" " Z3, Z4, Z7 & Z9	—A1302-2K "2K MEMORY"
A1302-2K/R	" " Z4, Z7 & Z9	—A1302-2K/R "2K MEMORY W/ROM"
A1302-4K	" " Z3, Z4 & Z9	—A1302-4K "4K MEMORY"
A1302-4K/R	ALL PARTS ARE INSTALLED.	—A1302-4K/R "4K MEMORY W/RAM"

NOTES: UNLESS OTHERWISE SPECIFIED

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	A	REVISED PER PROTO EVALUATION	1-20-81	
	A1	REMOVE C7; REPLACE CR1 & 2 W/JUMPERS	10-5-81	
	A2	CHANGED C8 TO .001μF/100%	4-19-82	



Part numbers are for replacement information. Equivalent or higher rated components may be substituted.

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UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: .XX ± .03, .XXX ± .010
ANGLES: 0° 30'
HOLE TOLERANCES

ENGINEERING ACTIVITY

DESIGN	JC SYSTEMS INC
DRAFTED	" 14 JAN 1981
CHECKED	
APPROV	
RELEASE	

DO NOT SCALE DWG

JC SYSTEMS, INC.
SAN DIEGO CALIFORNIA

TITLE: PRINTED CIRCUIT BD SCH— SUPER MICRO COM MODEL A1302

DASH	QTY	NEXT ASSY	USED ON	SERIAL NO.	DATE EFF	DWG REV
	1	A1302		1 → ON	1/14/81	N/C
APPLICATION				EFFECTIVITY		

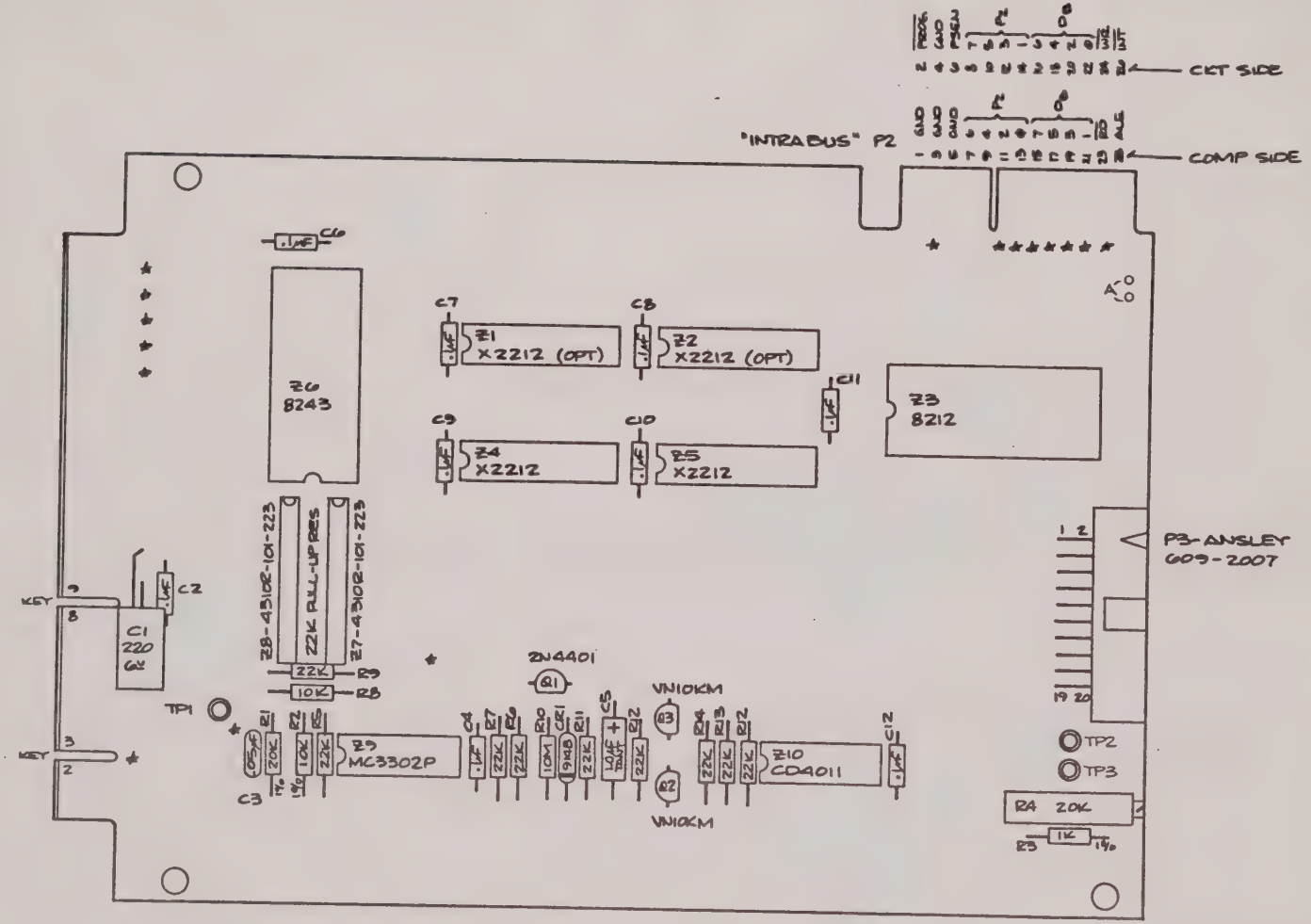
MATERIAL ⚠1
FINISH ⚠2

SIZE	CODE IDENT		
D		1301	A2

SCALE N.A. 27 1644590 SHEET 1 OF 1

ZONE	LTR	DESCRIPTION	DATE	APPD

— SEE SCH 1378 —



Part numbers are for replacement information. Equivalent or higher rated components may be substituted.

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⚠ FINISH (IF APPLICABLE)

⚠ MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

DASH	QTY	NEXT ASSY	USED ON
	1	END ITEM	
APPLICATION			

SERIAL NO.	DATE EFF	DWG REV
1 ON		N/C
EFFECTIVITY		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: .XX ± .03, .XXX ± .010
ANGLES: 0°30'

HOLE TOLERANCES
.015 THRU .133 +.004 −.001
.321 THRU .500 +.006 −.001
.136 THRU .300 +.008 −.001
.501 THRU .750 +.008 −.001

MATERIAL ⚠1
FINISH ⚠2

DO NOT SCALE DWG

ENGINEERING ACTIVITY

DESIGN	JC SYSTEMS INC.
DRAFTED	18 JAN 1982
CHECKED	
APPROV	
RELEASE	

JC SYSTEMS, INC.

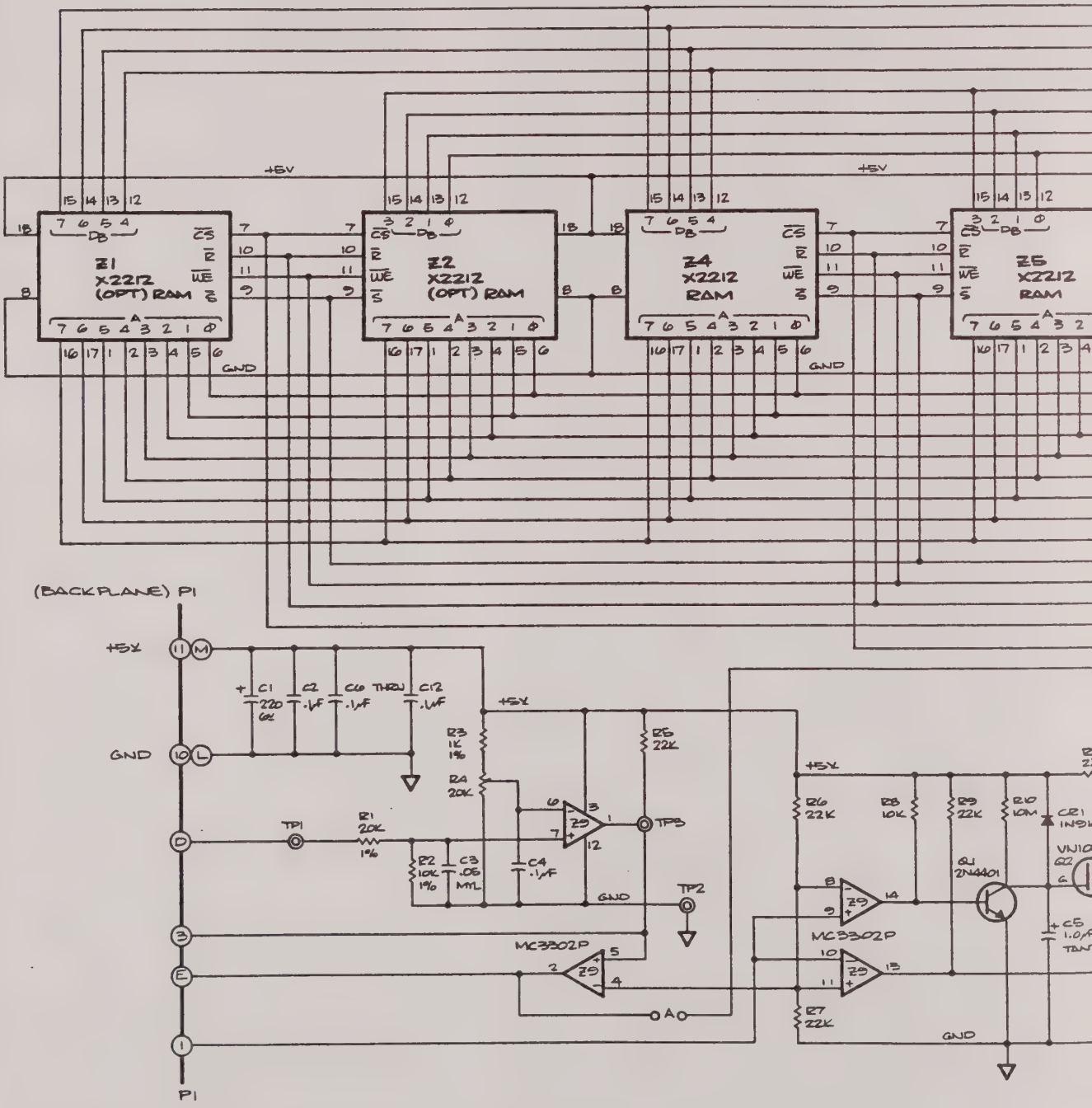
TITLE: PRINTED CIRCUIT BD ASSY — RAM SAVE MEMORY MODEL A1379

SIZE	CODE IDENT		
C		1379	A

SCALE 2:1

SHEET 1 OF 1

"INTRA BUS"

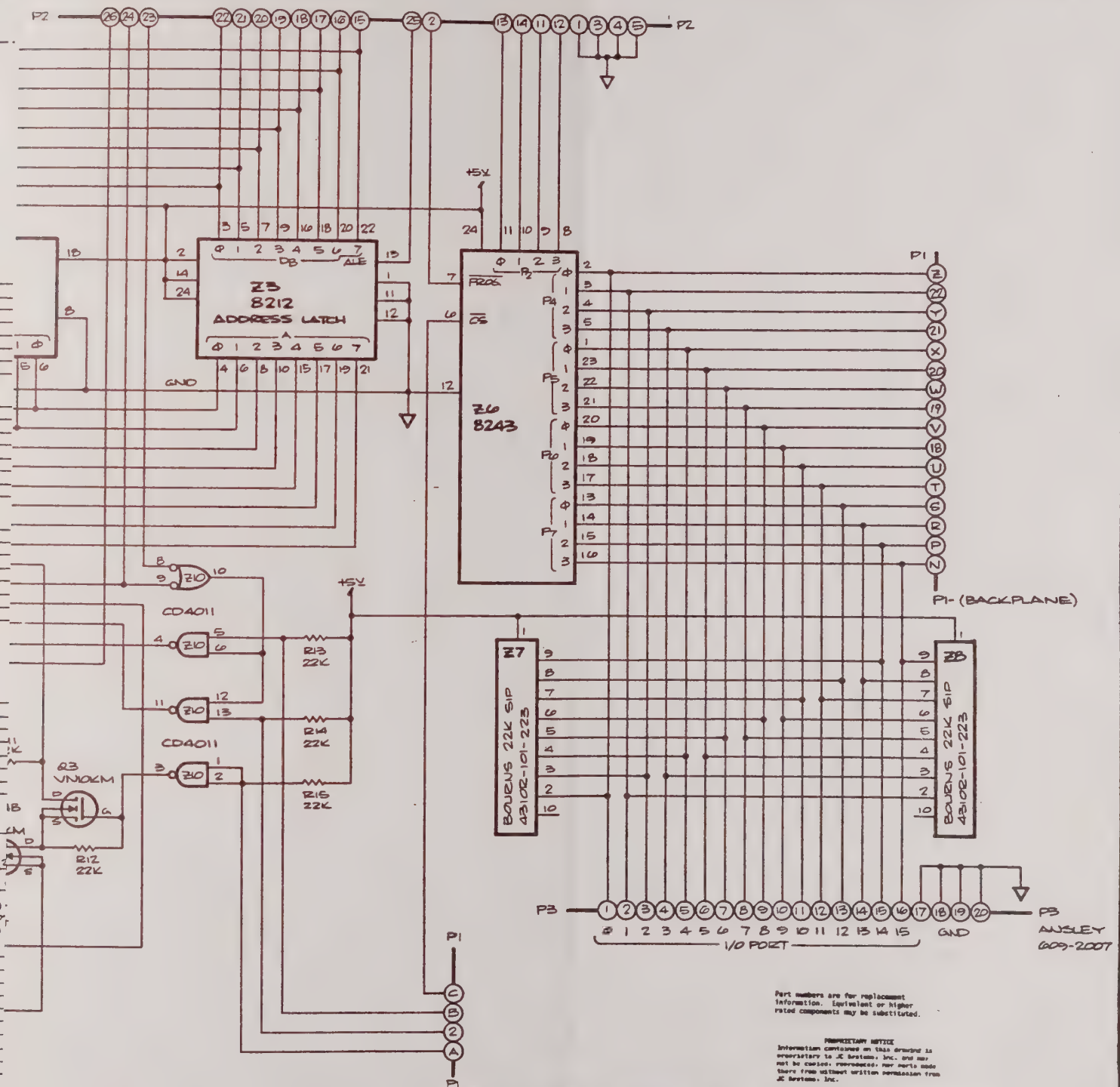


⚠2 FINISH (IF APPLICABLE)

⚠1 MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	A	CORRECTED ARTWRK (TAPE BETWEEN PADS) & MISC. SCH CORRECTIONS PER PROTO	3-2-82	



Part numbers are for replacement information. Equivalent or higher rated components may be substituted.

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DASH	QTY	NEXT ASSY	USED ON
	1	A1379	N.C.

APPLICATION | SERIAL NO. 1900 | DATE EFF | DWG REV | EFFECTIVITY

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± .03 .XXX ± .010
ANGLES ± 30'
HOLE TOLERANCES
.011 THRU .033 +.004 -.001
.031 THRU .249 +.006 -.001
.234 THRU .249 +.006 -.001
.251 THRU .750 +.006 -.001

MATERIAL ⚠1
FINISH ⚠2
DO NOT SCALE DWG

ENGINEERING ACTIVITY

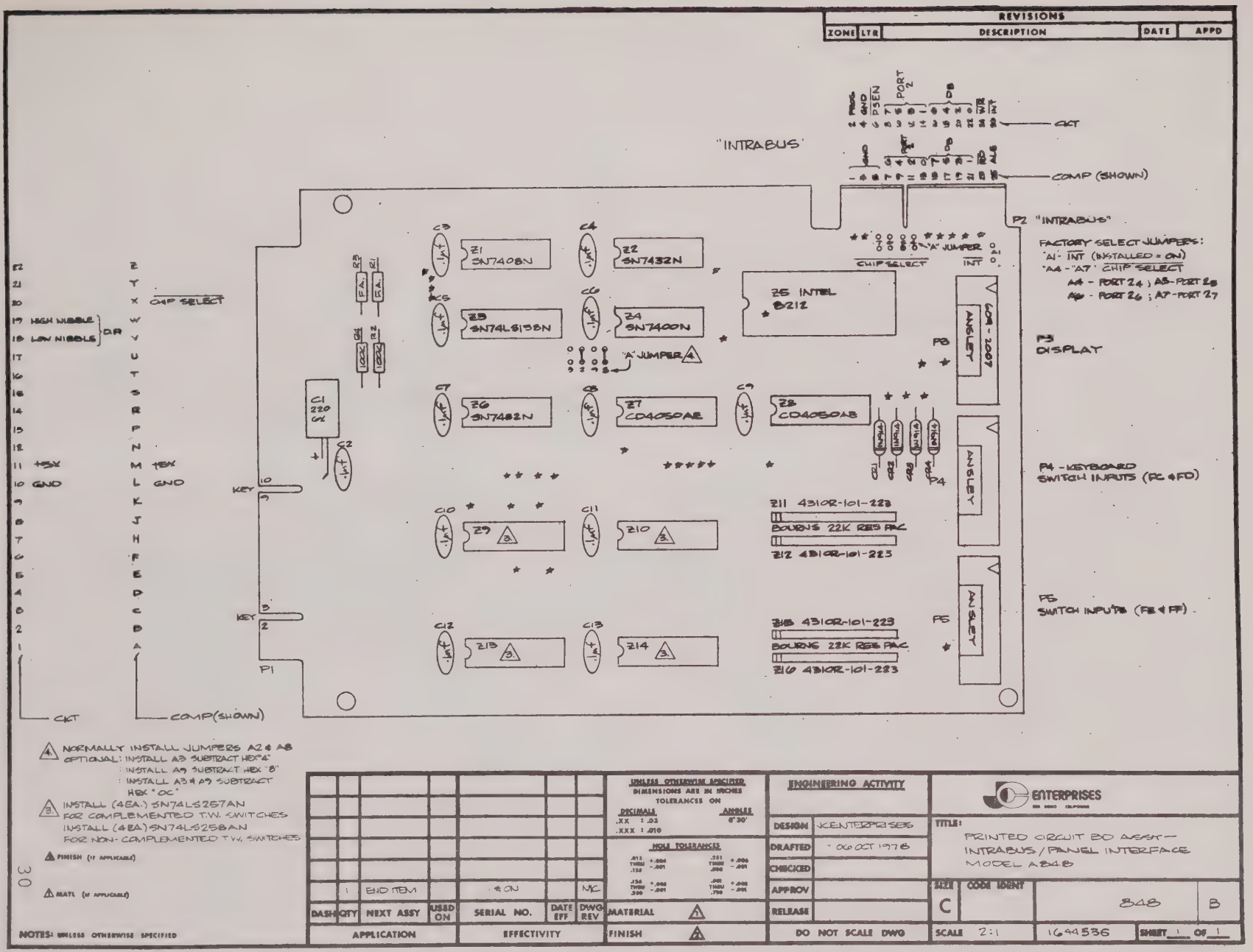
DESIGN	JK SYSTEMS INC
DRAFTED	" 18 JAN 1982
CHECKED	
APPROV	
RELEASE	

JK SYSTEMS, INC.

TITLE: PRINTED CIRCUIT BD SCH- RAM SAVE MEMORY MODEL A1379

SIZE	CODE IDENT		
D		1378	A

SCALE N.A. SHEET 1 OF 1



4. NORMALLY INSTALL JUMPERS A2 & A8
OPTIONAL: INSTALL A3 SUBTRACT HEX "4"
: INSTALL A9 SUBTRACT HEX "8"
: INSTALL A3 & A9 SUBTRACT HEX "C"

3. INSTALL (4EA.) SN74LS257AN FOR COMPLEMENTED T.W. SWITCHES
INSTALL (4EA.) SN74LS258AN FOR NON-COMPLEMENTED T.W. SWITCHES

⚠ FINISH (IF APPLICABLE)

⚠ MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

DASH	QTY	NEXT ASSY	USED ON	SERIAL NO.	DATE EFF	DWG REV
	1	END ITEM		# ON		NC
APPLICATION				EFFECTIVITY		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± .03 .XXX ± .010
ANGLES 0°30'

MOLD TOLERANCES

MATERIAL ⚠1
FINISH ⚠2

ENGINEERING ACTIVITY

DESIGN	KENTERPRISES
DRAFTED	" 06 OCT 1978
CHECKED	
APPROV	
RELEASE	

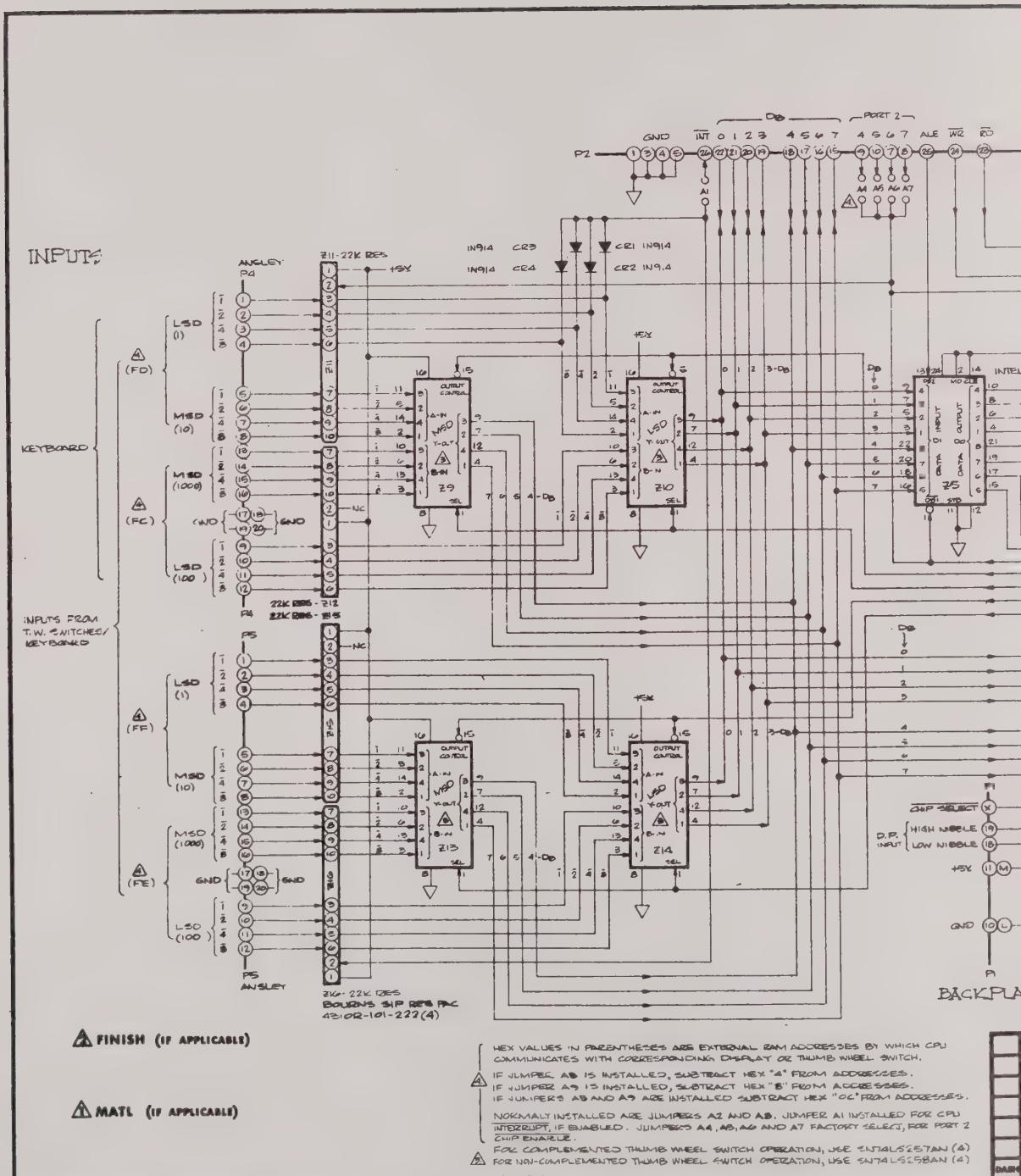
DO NOT SCALE DWG

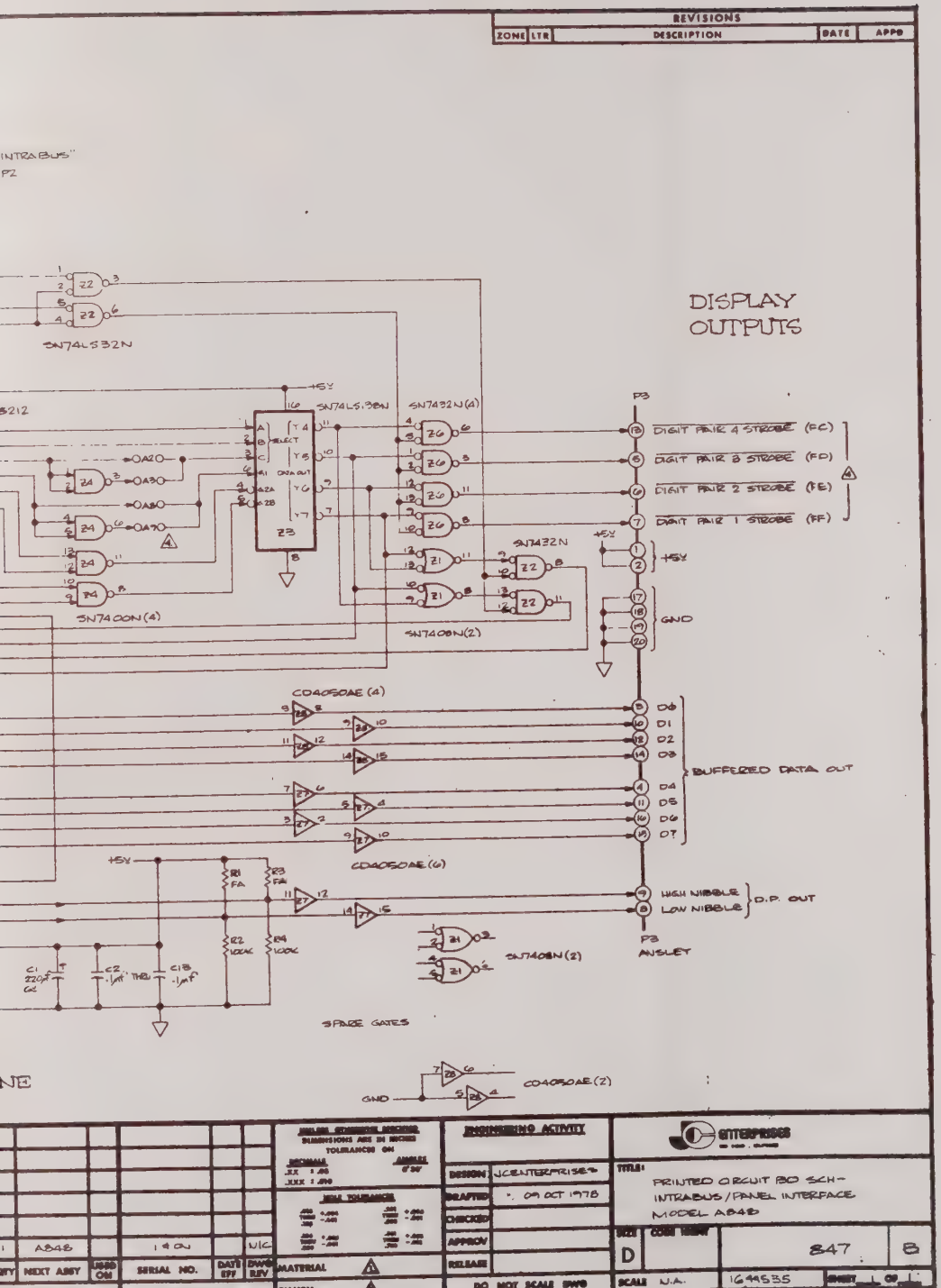
KENTERPRISES
SAN DIEGO CALIFORNIA

TITLE: PRINTED CIRCUIT BD ASSY — INTRABUS / PANEL INTERFACE MODEL A848

SIZE	CODE IDENT		
C		848	B

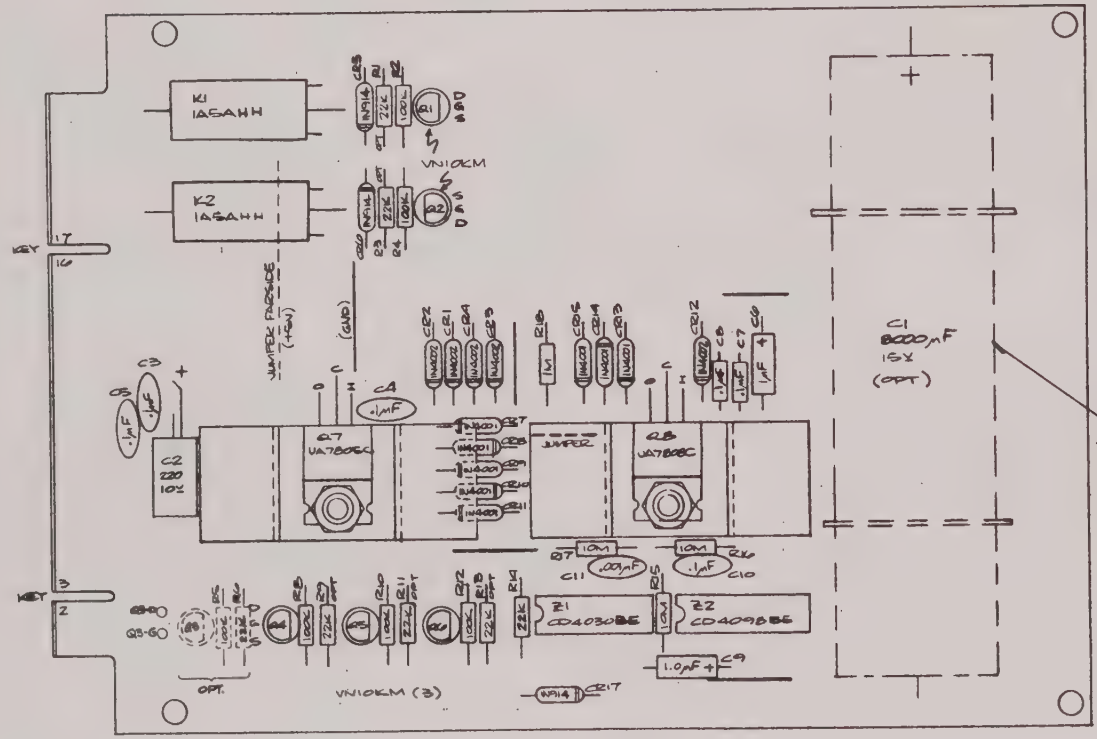
SCALE 2:1 | 1694536 | SHEET 1 OF 1


INPUTS
KEYBOARD
INPUTS FROM T.W. SWITCHES/ KEYBOARD
ANGLE
P4
P5
Z11-22K RES
Z16-22K RES
BOURNS SIP RES PAC 4816R-101-222(4)
22K RES-Z12
22K RES-Z15
LSD (1)
MSD (10)
MSD (100)
LSD (100)
GND
NC
+5V
IN914 CR3
IN914 CR4
CR1 IN914
CR2 IN914
Z9
Z10
Z13
Z14
Z5
OUTPUT CONTROL
A-IN
B-IN
MSD Y-OUT
LSD Y-OUT
SEL
DB
PORT 2
GND INT 0 1 2 3 4 5 6 7 ALE WR RD
P2
A1
A4 A5 A6 A7
INTEL
MD 215
INPUT DATA
OUTPUT DATA
CHIP SELECT
D.P. INPUT
HIGH NIBBLE
LOW NIBBLE
BACKPLA
FINISH (IF APPLICABLE)
MATL (IF APPLICABLE)
HEX VALUES IN PARENTHESES ARE EXTERNAL RAM ADDRESSES BY WHICH CPU COMMUNICATES WITH CORRESPONDING DISPLAY OR THUMB WHEEL SWITCH.
IF JUMPER A8 IS INSTALLED, SUBTRACT HEX "4" FROM ADDRESSES.
IF JUMPER A9 IS INSTALLED, SUBTRACT HEX "8" FROM ADDRESSES.
IF JUMPERS A8 AND A9 ARE INSTALLED SUBTRACT HEX "0C" FROM ADDRESSES.
NORMALLY INSTALLED ARE JUMPERS A2 AND A8. JUMPER A1 INSTALLED FOR CPU INTERRUPT, IF ENABLED. JUMPERS A4, A5, A6 AND A7 FACTORY SELECT, FOR PORT 2 CHIP ENABLE.
FOR COMPLEMENTED THUMB WHEEL SWITCH OPERATION, USE SN74LS251AN (4)
FOR NON-COMPLEMENTED THUMB WHEEL SWITCH OPERATION, USE SN74LS251BAN (4)
NOTES:
NOTES: UNLESS OTHERWISE SPECIFIED


REVISIONS
ZONE LTR DESCRIPTION DATE APPD
INTRABUS"
PZ
DISPLAY
OUTPUTS
SN74LS32N
SN74LS138N
SN7432N(4)
SN7400N(4)
SN7408N(2)
SN7432N
CD4050AE(4)
CD4050AE(6)
CD4050AE(2)
SPARE GATES
P3
DIGIT PAIR 4 STROBE (FC)
DIGIT PAIR 3 STROBE (FD)
DIGIT PAIR 2 STROBE (FE)
DIGIT PAIR 1 STROBE (FF)
+5V
GND
BUFFERED DATA OUT
D.P. OUT
HIGH NIBBLE
LOW NIBBLE
P3
ANSLEY
ENGINEERING ACTIVITY
DESIGN J.CENTERPRISES
DRAFTED 09 OCT 1978
TITLE: PRINTED CIRCUIT BD SCH-
INTRABUS/PANEL INTERFACE
MODEL A848
SIZE D
847 B
SCALE N.A.
1644535
A848
SERIAL NO.
MATERIAL
FINISH
DO NOT SCALE DWG

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
		SEE SCH # 1079		

22	K1-1
21	K1-2
20	Q1-IN (G)
19	Q2-IN (G)
18	K2-2
17	K2-1
16	+9V
15	+12V
14	8VAC-1
13	8VAC-2
12	EXT CAP (+)
11	+5V
10	GND
9	+5V PULSED
8	Q6-OUT (D)
7	Q6-IN (G)
6	Q5-OUT (D)
5	Q5-IN (G)
4	Q4-OUT (D)
3	Q4-IN (G)
2	AUTO CHECK IN
1	RESET OUT



FINISH (IF APPLICABLE)

MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

DASH	QTY	NEXT ASSY	USED ON
	1	END ITEM	
APPLICATION			

SERIAL NO.	DATE EFF	DWG REV
140N	14.80	N/C
EFFECTIVITY		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± .03 .XXX ± .010
ANGLES 0°30'
HOLE TOLERANCES
.013 +.004 -.001 THRU .125
.251 +.004 -.001 THRU .500
.726 +.008 -.001 THRU .750
.501 +.008 -.001 THRU .700

MATERIAL ⚠
FINISH ⚠

ENGINEERING ACTIVITY

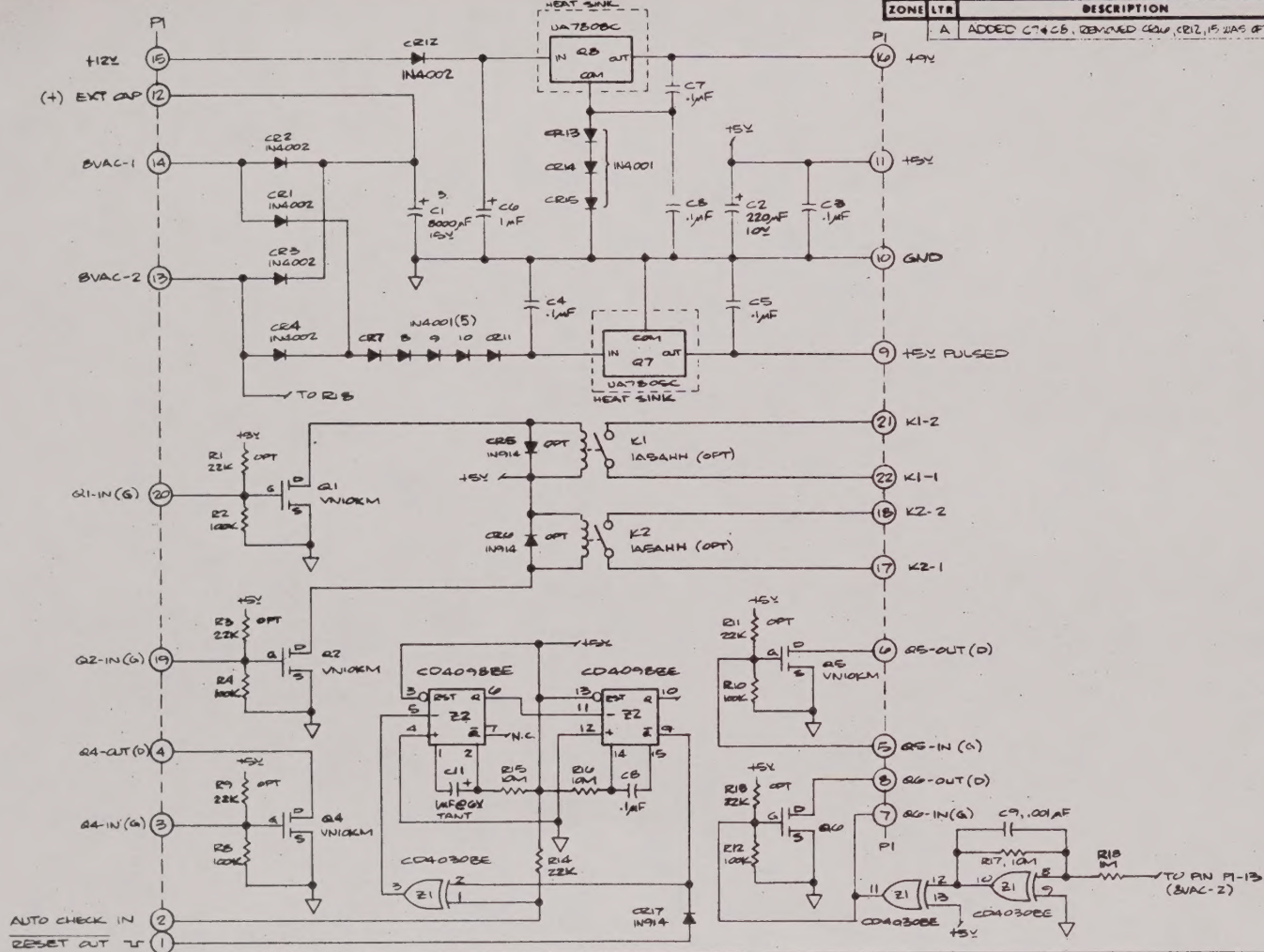
DESIGN	JCSYSTEMS INC
DRAFTED	11 04 JAN 1980
CHECKED	
APPROV	
RELEASE	

DO NOT SCALE DWG

ENTERPRISES
SAN DIEGO CALIFORNIA

TITLE: PRINTED CIRCUIT BD ASSY - PROGRAMMER UTILITY BD. MODEL A1080

SIZE	CODE IDENT		
C		1080	A
SCALE 2:1		1644572	SHEET 1 OF 1



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPD
	A	ADDED C7 & C8. REMOVED CR10, CR12, 15 WAS OPT.	4-28-80	

⚠2 FACTORY SELECT: CAP C1 CAN BE LOCATED ON OR OFF P.C. BD.

⚠FINISH (IF APPLICABLE)

⚠MATL (IF APPLICABLE)

NOTES: UNLESS OTHERWISE SPECIFIED

DASH	QTY	NEXT ASSY	USED ON
	1	A1080	
APPLICATION			

SERIAL NO.	DATE EFF	DWG REV
1 & ON	1-4-80	N/C
EFFECTIVITY		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: .XX ±.03, .XXX ±.010
ANGLES: 0°30'
HOLE TOLERANCES:
.013 THRU .125 +.004 −.001
.251 THRU .500 +.006 −.001
.126 THRU .250 +.006 −.001
.501 THRU .750 +.008 −.001

MATERIAL ⚠1
FINISH ⚠2

ENGINEERING ACTIVITY

DESIGN	JCS SYSTEMS INC.
DRAFTED	04 JAN 1980
CHECKED	
APPROV	
RELEASE	

DO NOT SCALE DWG

JC ENTERPRISES

TITLE: PRINTED CIRCUIT BD SCH — PROGRAMMER UTILITY BD MODEL A1080

SIZE	CODE IDENT		
C		1079	A
SCALE N.A.		1644571	SHEET 1 OF 1

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